MOTOR AGE

Vol. XXXIII
No. 2

CHICAGO, JANUARY 10, 1918

Ten cents a copy
Three dollars a year

Heavy Stone for High-Powered Cars $1.25

IF YOU put your spark plugs in a vise and exerted all your strength to subject them to the greatest possible pressure, you would expect the porcelain to crumble.

Yet that's virtually what they must stand in your motor.

As you get under way, the explosions in your cylinders become so rapid that the force they exert is practically continuous.

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The two patented copper gaskets that protect the porcelain where the pressure comes are lined with asbestos so that the metal cannot touch the porcelain.

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Keep your Champion stock complete—it means biggest possible volume of spark plug sales, quick turnover, maximum profits.

Champion Spark Plug Company, Toledo, Ohio

Editorial Contents—Page 3

Advertisers' Index—Next to Last Page

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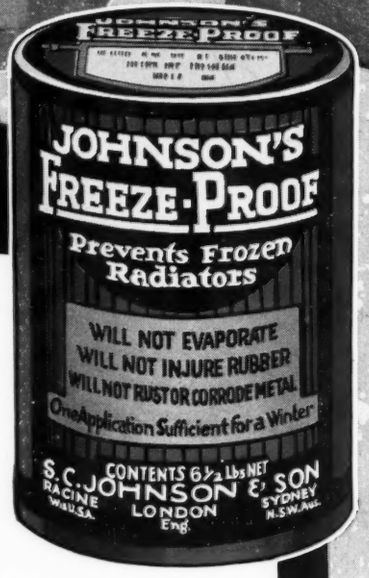

THE only way you can be positive that your radiator won't freeze up this winter is to use a non-evaporating, anti-freeze preparation. The present high cost of alcohol—its low boiling point—and quick evaporation make it impractical. Besides, you are asked to conserve the supply of alcohol for use in explosives.

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Johnson's Freeze-Proof does not evaporate so one application is sufficient for the whole winter unless the solution is weakened by leakage of the radiator or hose connection, through the overflow pipe, or by boiling over.

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Write for our new booklet, entitled "Keep Your Car Young". — We will send it to you free and postpaid. — The information in this book will enable you to greatly improve the appearance and the performance of your car.

S. C. JOHNSON & SON **DEPT. MA** **RACINE, WISCONSIN**

MOTOR AGE

Published Every Thursday by the
CLASS JOURNAL COMPANY
Mallers Building
CHICAGO ILLINOIS

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Vol. XXXIII Chicago, January 10, 1918 No. 2

Contents

WAR FAILS TO DIM NEW YORK SHOW..... 5
THE FASHION MART..... 12
THE WEEK'S ACTIVITIES AT WASHINGTON.. 16
EDITORIAL—FASTIDIOUS DAME FASHION—GOVERNMENT AND CARS—UNITY IN DESIGN — THE SPARE WHEEL — WINTER MOTORING 18
MOTOR MAIL IS PLANNED..... 20
DESIGN OF EUROPEAN AVIATION TRUCK..... 22
THE STRAIGHT-LINE DESIGN..... 24
FEW NEW CARS AT EXHIBITION..... 30
NEW DEVICES AT NEW YORK..... 39
ELECTRICAL EQUIPMENT OF THE MOTOR CAR 42

DEPARTMENTS

MOTOR CAR REPAIR SHOP..... 45
READERS' CLEARING HOUSE..... 46
AMONG THE MAKERS AND DEALERS..... 52
FROM THE FOUR WINDS..... 54

NEXT WEEK

The feature of Motor Age for next week will consist of an article on Women in Wartime, in which will be taken up the question of the influence of war on the employment of women as workers, with reference to the automotive industry.

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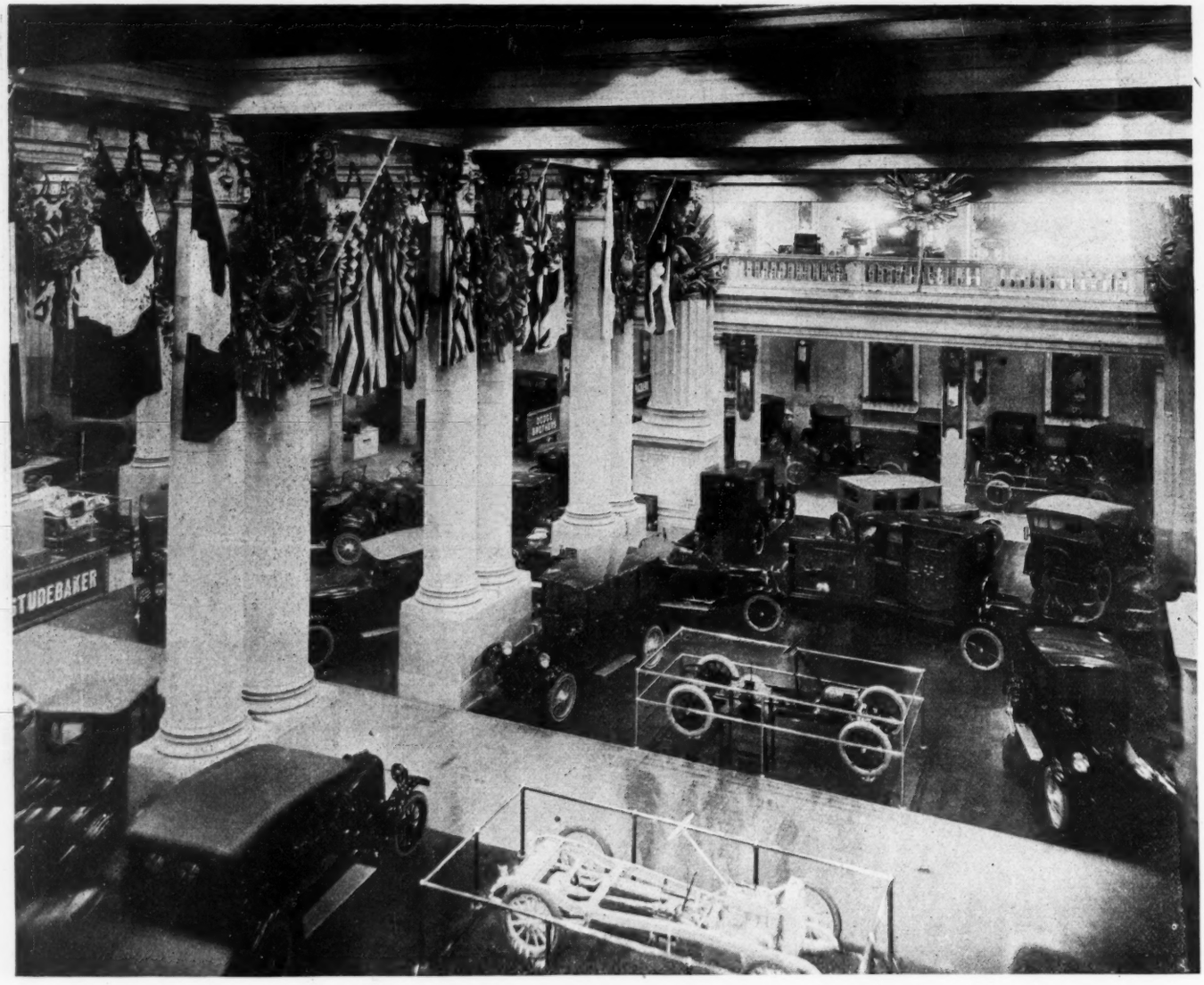
War Fails to Dim New York Show

By Darwin S. Hatch

NEW YORK, Jan. 5.—American motor cars for the new year made their bow to the motoring public today when the Grand Central Palace was formally opened as the eighteenth national motor car show. In spite of war and the necessary turning of the industry somewhat to direct war vehicles the motor world is represented more largely this year than it has been at any preceding show. The industry of motordom, which is becoming one of the supreme factors in the allied plans for victory, is represented at the Grand Central Palace by 331 exhibitors, seven more than last year. The fact that the industry is so well represented is to an extent its reply to the many false reports and rumors of dire things about to happen to this third largest industry in America—rumors that the motor car was to be branded a non-essential and its manufacture curtailed and that its supplies of materials and fuel and special alloy steel were to be denied to the factories and even that the general use of motor cars was to be prohibited on account of some imagined scarcity of gasoline.

True enough, the hand of war has depressed the motor industry, just as it has depressed other industries, but the present exhibition is an evidence of its great resiliency and inherent strength. In point of attendance the first night this year is not coming up to the record of opening nights of the last two seasons. The reasons are both climatic and temperamental. Weather conditions in and around New York are not such as tempt people out, and it is doubtful that the entire week of the show will see as many curiosity-impelled sight-



This view of the Grand Central Palace gives a good idea of the decorations, which are simple but effective

seers at the Grand Central Palace as previous years have seen.

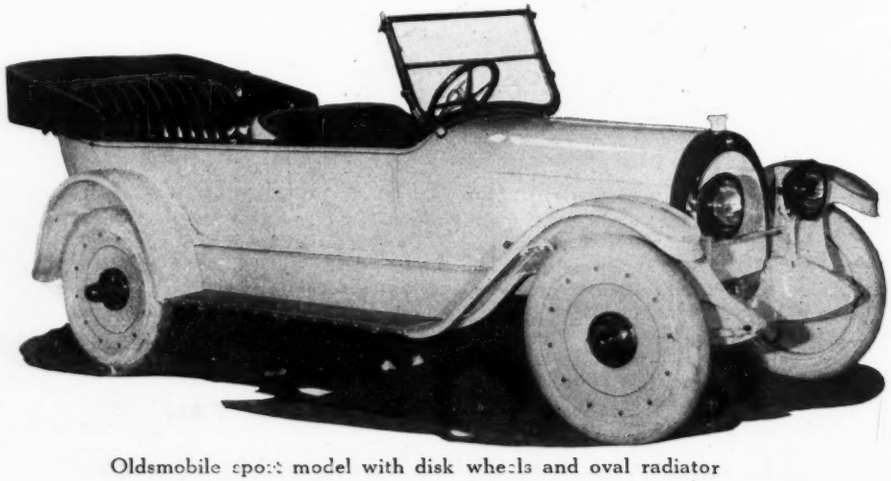
This probably will be a blessing, even should the actual attendance fall below that of previous seasons, because those who attend under unfavorable weather conditions are more likely to be the real business producers after the show is over. At that the entire four floors of the Grand Central Palace devoted to the exhibition of tires and accessories were well filled, uncomfortably so at times.

Same Staging Plan

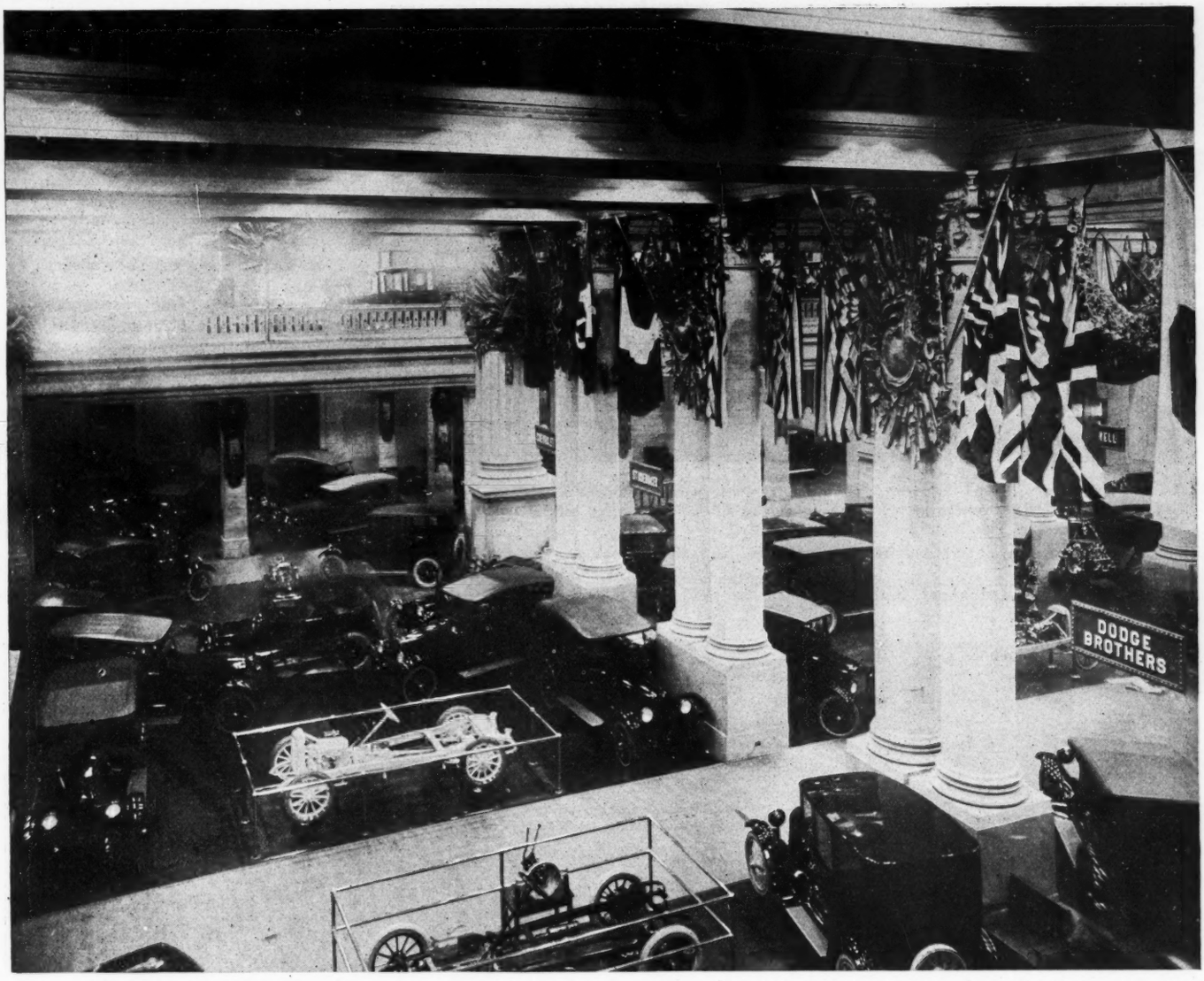
The same arrangement as has been used for three years in staging the exhibition is employed this year. The first four floors of the Grand Central Palace are devoted to the motor cars and their accessories. The cars have the whole of the main floor as well as all of the second, or mezzanine; the third is devoted to both cars and accessories, and the fourth, or top floor, is given over wholly to accessories. In order that the visitors may be distributed about the different floors as widely as possible, the two-year old system of operating the elevators only between the first and fourth floors and carrying passengers upward only is followed. This makes all who would leave the first floor visit all floors in their downward progress.

Of the 331 exhibitors, seventy-nine are showing cars. This is a lower number than last year, but there are over a score more accessory exhibitors than in 1917. Two hundred and ninety-seven cars and chassis are on display, not as many by forty-three as last year. Thirty-four of the displays are chassis, most of them cut away and operating.

Settings for the display are not as elaborate as they have been formerly, but are somewhat more patriotic and warlike in character, and withal are just as artistic. The decorative scheme features the flags of the allies, and the stars and stripes are much in evidence. Hundreds of hand-



Oldsmobile sport model with disk wheels and oval radiator



The flags of the Allied nations, radiating from the shields which represent the flame of Liberty, mark the Palace

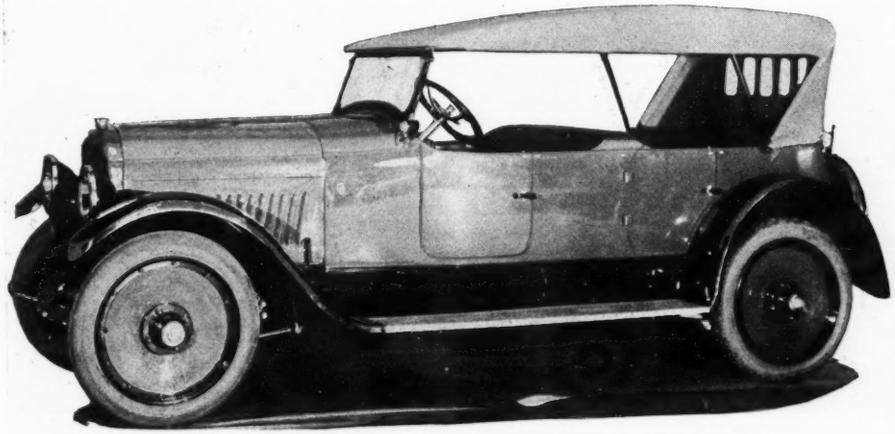
painted curtains, which have the appearance of tapestry and bear designs of crests, coats of arms, pictures of crusaders and medieval warriors, produce a martial atmosphere, and many of the booths display service flags indicating in some individual instances the spirit which has given thousands of men from the industry to the service.

On the main floor the tapestry banners which carry the name of the car displayed measure 7 by 14 ft. The gigantic pillars on the main floor are decorated with shields which represent the flame of Liberty, with the flags of the allies arranged radially from the shield. A feature of the decoration is a large painting entitled "The Hour of Deliverance." It represents a group of Allied soldiers arriving at a French town in the nick of time to save the inhabitants from the Prussians. Other large scenic paintings hide the windows, at the sills of which are boxes of plants and pendant vines. The lattice work and plaster cast conception of decoration have been abandoned.

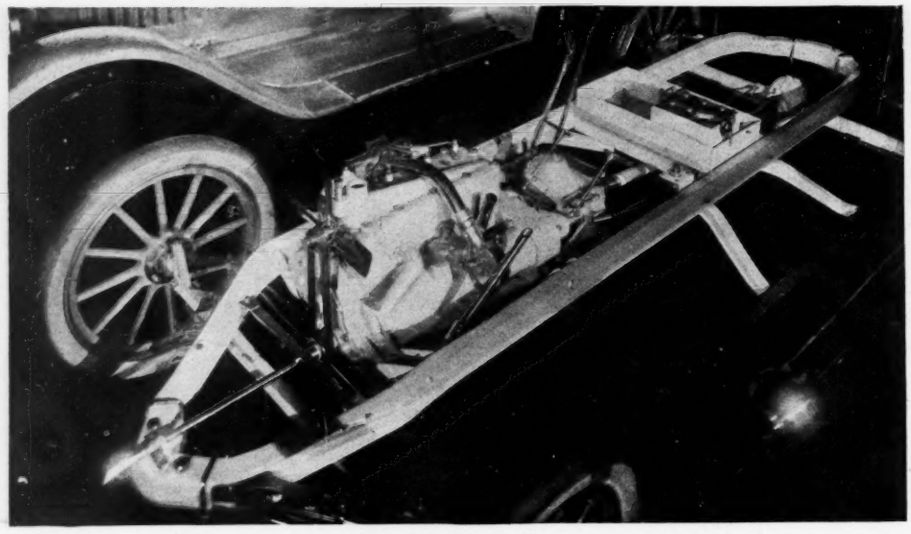
One of the remarkable features of the show management in previous years was that exhibits were all in place at the hour of opening. This is not the case this year, for there were a number of spaces this afternoon for which exhibits have not arrived. Freight embargoes, weather conditions and the general slowing-up of domestic freight made it impossible to get all the cars on the floor in time. During the Sunday intermission it is probable that the two or three laggards will be put into place.

New Overland Shown

Mechanically the newest feature of interest at the show is the new low-priced Overland, as not only is it making its first appearance here, but there was very little generally known except that such a car was proposed. The mechanical description and illustration of the unusual features of framing and suspension which characterize



Paige sport model with disk wheels and low center cowl



Overland chassis, showing V-shaped end of frame at front and rear quarter-elliptic springs which give riding effect of longer wheelbase

the car are given in detail on the other pages.

Interest also centered about the steam cars. Whether or not this is due simply to natural curiosity for the unusual, the abilities of the lecturers or a real basic interest in the steamer is a matter of question, but it is certain that few exhibits were more closely examined and few more crowded than were those of the two steamers, Stanley and Doble.

Among the accessories there are not as many novel and eye-catching arrangements to stop the passerby as there have been in previous years. There are, however, some exceptionally well arranged displays and many which are intended to be instructive and educational rather than designed to block up the aisleway with curiosity seekers.

The carburetor displays are well arranged, Wheeler & Schebler showing its new plain-tube models and attractive frame. The most elaborate and carefully planned of the accessory exhibits is that of the Stewart-Warner Speedometer Corp., which, for the last four years, has led the accessory field in the character of its display. The young women in white who have featured the speedometer and vacuum feed booths of the Stewart company before this year seem to be somewhat missed, but from an educational standpoint the display is improved.

For the first time since the old days of the

Seven more exhibitors altogether than last year are represented in the displays at the Grand Central Palace

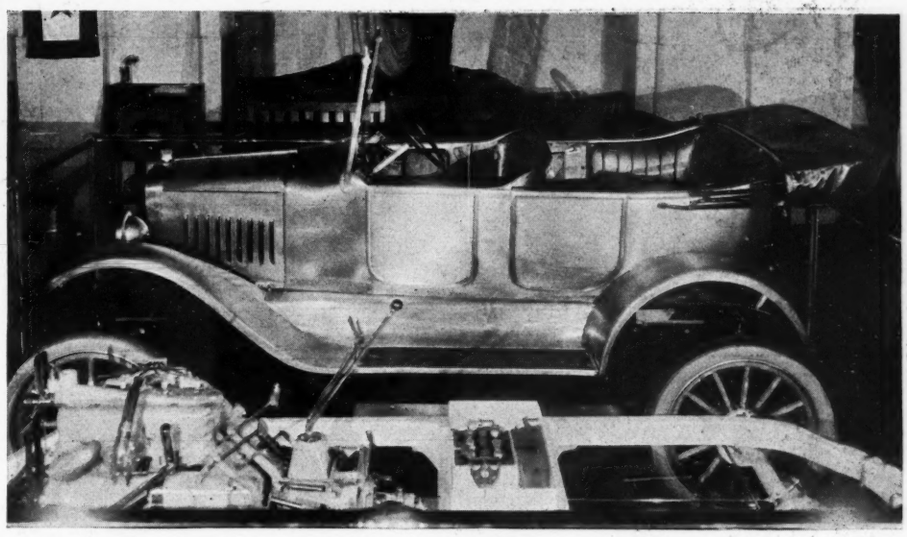
truck shows, there are to be found trucks or truck attachments at the Palace. There were three makes of Ford converters designed to get the maximum mileage out of second-hand passenger cars. Two of these were for changing the Ford into a tractor and the other one to change it into a truck.

The census of the accessories leaves one with the impression that a great deal more attention is being paid this year to such features as will make for more efficient operation of the car and particularly improvement in the fuel economy. There are several generators designed to enable kerosene to be used as fuel and a host of arrangements for introducing water, water vapor and extra air into the manifold for handling better the low-grade fuel.

Four Electric Exhibits

Among the electric exhibits four different makes are shown. These are the Detroit, Milburn, Ohio, and Baker R & L. Electrics as a whole seem to show a greater tendency for gas car lines evidenced particularly in the new Milburn body.

There are two cut-away bodies of particular interest which show the method of construction of the body. Marmon again this year is showing its body in section to illustrate the framing and upholstery and in addition, Dort has a body framing exhibit somewhat similar that is designed to show the mechanics of body building.



Side view of the new Overland all-metal body which is exhibited by the side of the chassis at the Grand Central Palace, New York

There is one new sleeve-valve engine on exhibition and aside from this there is little in the accessory exhibits that shows

Against a column in the center ground can be seen one of the service flags which were displayed

Looking down an aisle at the Palace, with service and other flags

great advancement in engine building. Features of this are taken up later.

Business Is Uncertain

New York, Jan. 8—Special telegram—This year's show at the Grand Central Palace will not be the success that last year's was from a business standpoint if the first three days are a criterion. Business at the show is always problematical. This year it is good but not so good as the previous one. The attendance is very much less than in recent shows, but the proportion of out-of-town visitors seems to be greater. Either on account of bad weather conditions or the war feeling local attendance is slight. It is doubtful if the attendance for the week will be three-quarters that of last year. On the other hand a greater proportion of the visitors come to look for cars rather than at them.

Curiosity seekers are absent. Dealers are more in evidence than before, because there are fewer retail buyers. The whole South and particularly the Southeast is especially well represented, and that seems to be the territory where most of the cars will be sold during the next twelve months, because that is where much of the money is being made. New England also is sending its dealers in large numbers. There are dealers from Canada, California, Montana and other western points.

SHOW SUMMARY

There are:
- 121 cars with wood wheels.
- 95 cars with wire wheels.
- 6 cars with disk wheels.

Of the dark cars:
- 52 are black.
- 17 dark green.
- 15 maroon.
- 9 dark blue.
- 4 dark red.
- 3 dark brown.

Of the bright cars:
- 20 are tan.
- 19 turquois blue.
- 16 light green.
- 13 grey.
- 10 yellow.
- 5 white.
- 5 light brown.
- 3 light yellow.
- 1 nile green.
- 1 purple.
- 1 orange.
- 1 red, white and blue.

Upholstery:
- 85 dull black leather.
- 53 whipcord.
- 27 colored leather.
- 24 shiny black leather.
- 10 shiny colored leather.
- 7 velvet.
- 5 broadcloth.
- 4 slip covers.
- 2 brocade.
- 2. corduroy.
- 1 cretonne.

Comparison of New York Show Records

STATISTICAL PICTURE OF THE SHOW GARDEN AND PALACE

	1913	1914	1915	1916	1917	1918
Total exhibitors	424	349	317	391	323	331
Car exhibitors	89	78	80	84	95	79
Accessory exhibitors	320	259	223	306	227	252
Motorcycle exhibitors	15	12	14	1	1	0

GRAND TOTAL (CARS AND CHASSIS TOGETHER)

2-cylinder	0	2	0	0	0	0
4-cylinder	202	162	126	116	120	82
6-cylinder	112	116	134	135	143	155
8-cylinder	0	0	8	41	47	36
12-cylinder	0	0	0	13	15	9
Steam	0	0	0	0	2	4
Electric	10	17	15	17	13	11
Total	324	297	283	322	340	297

GASOLINE CARS

Touring	162	143	124	117	128	132
Roadster	49	50	48	75	67	40
Limousine	23	15	18	11	16	8
Berline	8	6	2	1	0	2
Coupé	19*	17	7	6	6	13
Phaeton	1	2	1	0	0	0
Landaulet	0	1	1	3	3	0
Raceabout	2	2	3	2	0	3
Sedan	2	2	3	2	0	*43
Town car	0	0	4	5	12	11
Total	266	265	221	251	272	252

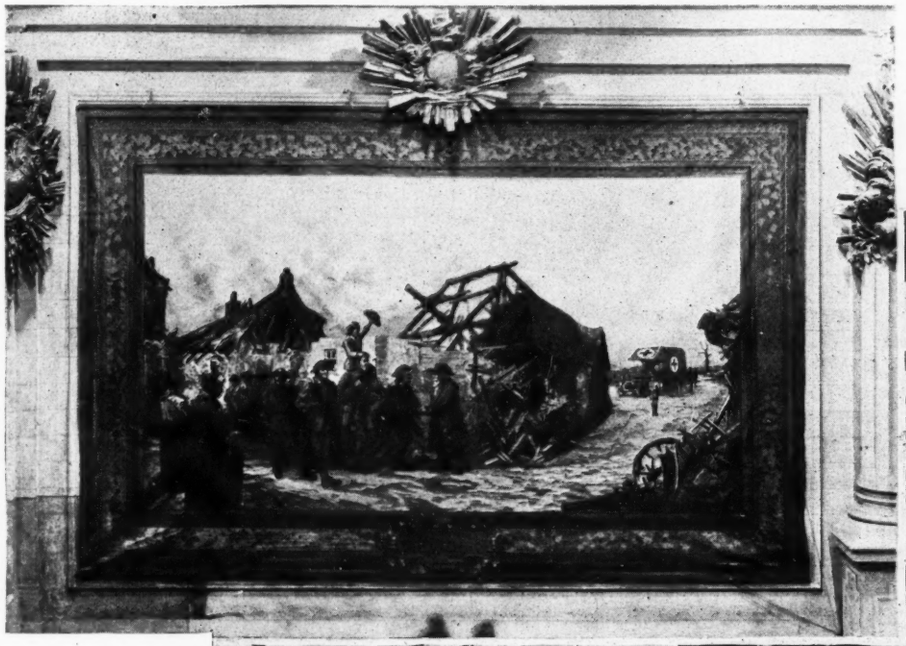
ELECTRIC CARS

Coupé	7	2	1	11	8	9
Cabriolet	0	0	1	1	0	0
Roadster	3	1	3	1	1	0
Town car	0	1	1	0	1	0
Limousine	0	0	1	0	0	1
Sedan	0	0	0	0	0	1
Total	10	4	7	13	10	11

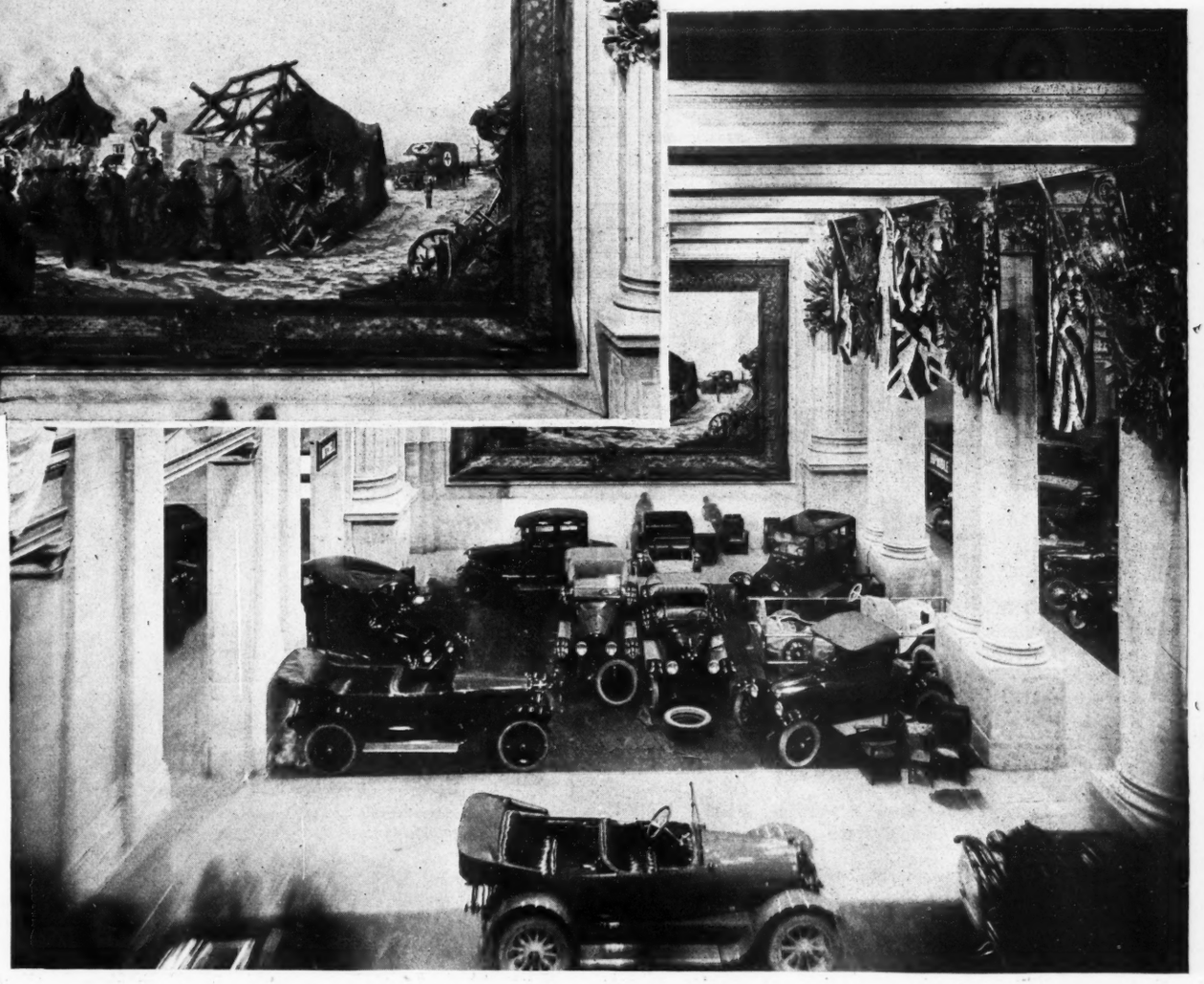
CHASSIS

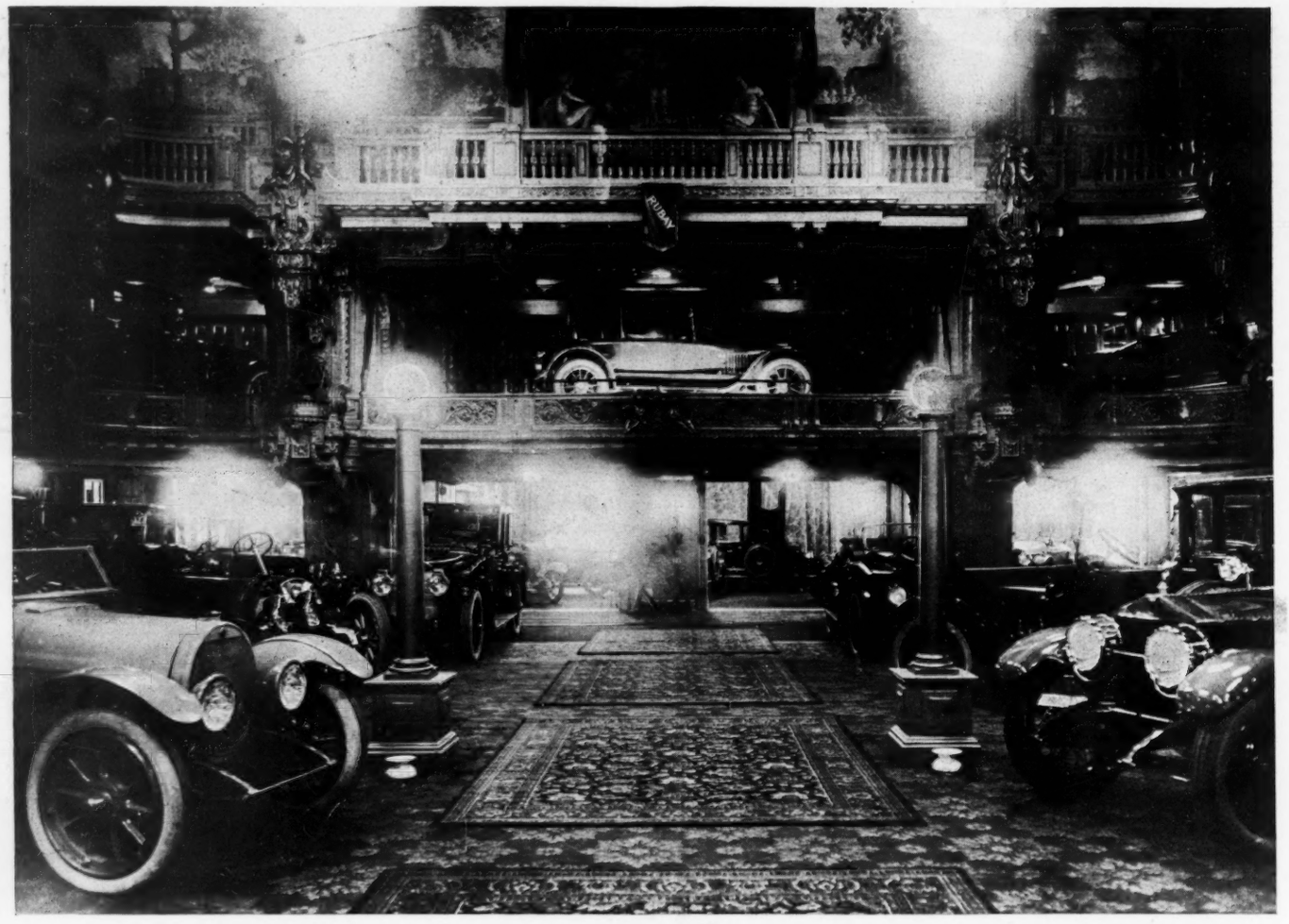
4-cylinder	27	21	20	19	26	12
4-cylinder (sleeve valve)	0	0	0	23	0	0
6-cylinder	21	15	26	19	18	16
8-cylinder	0	0	1	8	6	4
8-cylinder (sleeve valve)	0	0	0	1	2	0
12-cylinder	0	0	0	4	1	0
Steam	0	0	0	0	0	2
Electric	1	1	4	2	1	0
Total	49	37	51	56	54	34

*Includes Convertibles.



Close-ups of decorations of Grand Central Palace, including the large painting, "The Hour of Deliverance," which was hung as shown in the photograph reproduced below





One end of the grand ballroom on the main floor of Hotel Astor in which the fourteenth annual salon is being held. This show is, with the exception of Rolls-Royce and Lancia, an exhibit of American cars. The runabout in the gallery is a Rubay body on a White chassis; at left, Brewster and Locomobile with Rolls-Royce and White on right, in the foreground

The Fashion Mart

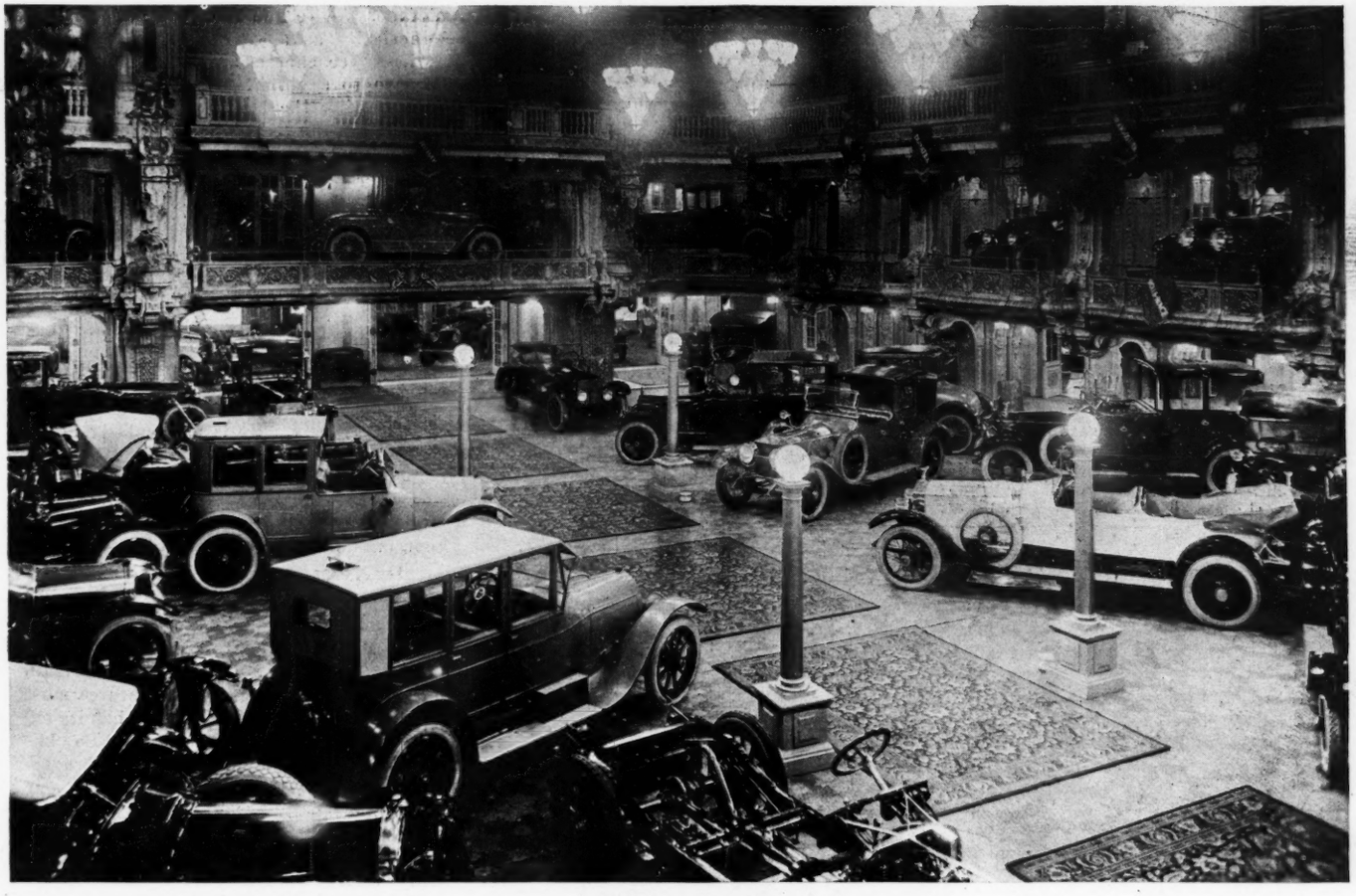
New York's Motor Car Salon the World's Greatest 1918 Display of Body Styles— New Goals for Production Design

By David Beecroft
Directing Editor Class Journal Co.

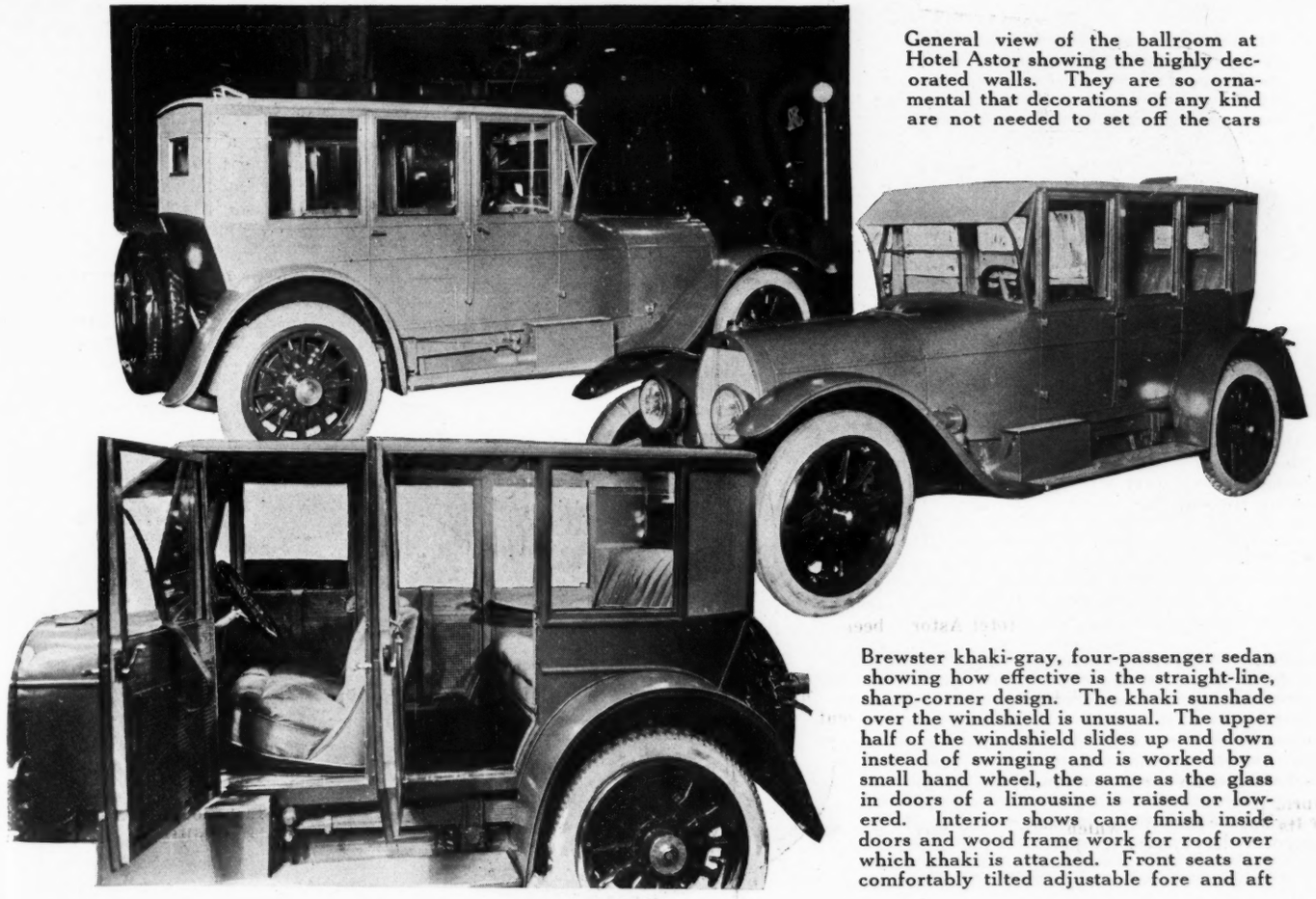
NEW YORK, Jan 5—The salon, which is the exclusive display of custom-made cars in New York and the finest exhibition of motor car bodies in America, and in the civilized world this year, has been running in the grand ballroom of Hotel Astor since Monday evening, Dec. 31. While this is not a large show, only fourteen exhibitors attending, it is a high-class body display. In fact, the school of body design can be better seen in this show than any other place. For example, Rolls-Royce, which occupies the premier position of the world as a dictator of body style, has five of its finest creations which were especially built in London for this show. It is rather remarkable that with the manufacture of passenger cars prohibited in England that these highest types of the art should have been made, but it indicates the desire of Great Britain to hold her position as premier in motor car body design.

Not only are the best British productions present, but many of the finest body-builders in America are showing their creations. The New York school is represented by Brewster, Healy, Locke, Holbrook and Brook-Ostruk, and in addition there is the Rubay Co. of Cleveland, which has established such a reputation in its brief history extending over two years.

So completely does the atmosphere of body design impress you in the Salon, which is the fourteenth annual one, that you are apt to forget that some of America's finest chassis and some of the finest chassis in the world are concealed artistically under the bodies. You are apt to forget that the sixteen-valve White, the six-cylinder Locomobile, the famous Rolls-Royce, the efficient Lancia, the reliable Simplex and other well-known chassis are also on exhibition. Fortunately the polished chassis of the Locomobile and the Simplex carry on the thought of how essential it is to have stability as the complement of artistic body lines. It is true there is not much novelty in the chassis

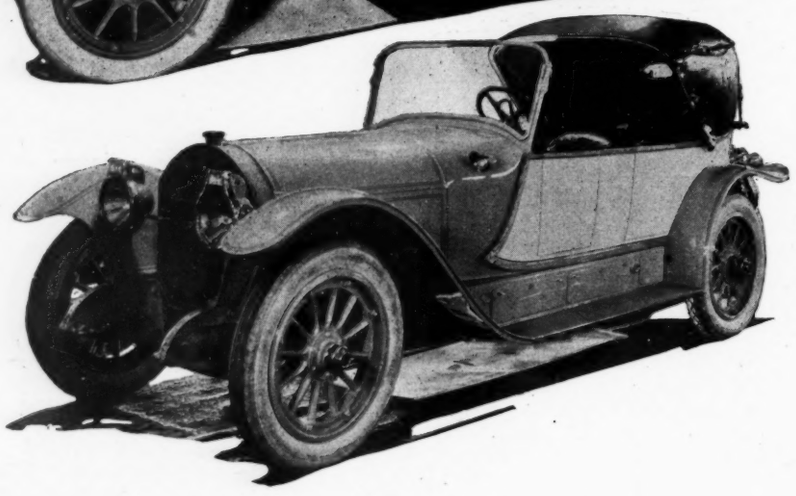


General view of the ballroom at Hotel Astor showing the highly decorated walls. They are so ornamental that decorations of any kind are not needed to set off the cars



Brewster khaki-gray, four-passenger sedan showing how effective is the straight-line, sharp-corner design. The khaki sunshade over the windshield is unusual. The upper half of the windshield slides up and down instead of swinging and is worked by a small hand wheel, the same as the glass in doors of a limousine is raised or lowered. Interior shows cane finish inside doors and wood frame work for roof over which khaki is attached. Front seats are comfortably tilted adjustable fore and aft

Cubist design on Murray chassis. This body is left with highly polished aluminum finish and is a striking example of carrying out in nearly every detail the straight line, sharp edge effect. The car was sold during the show to a Carnegie



details. White and Locomobile chassis are practically as a year ago. Many of the Rolls-Royce chassis are old models, and it is safe to say that not a single one was built during the last twelve months. For this reason the technical aspect of the salon can be dismissed and the display studied as the finest exhibit of the war year of 1918. Paris is without its Grand Palais show, London is without its Olympia, Berlin is in the same saddle, and the body design for the motor car world is in New York. For this reason the display is historic.

Custom body design is generally like the design of a lady's seal coat or a high-priced gown in that the designer feels happiest when he has conceived a design that is difficult to copy. He is particularly happy if the design does not admit of readily being produced in quantity. By such a course the exclusiveness of a custom body is perpetuated and the production designer kept outside the pale.

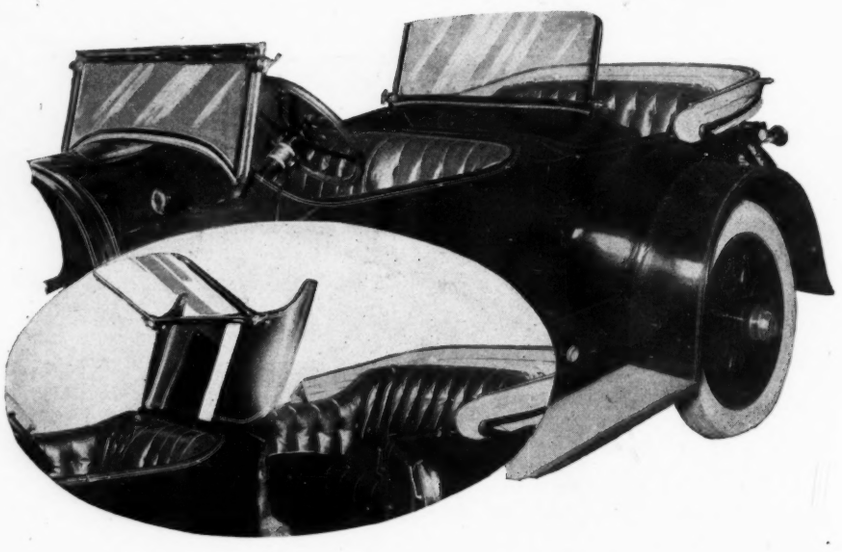
Greater Versatility

This has resulted in variety of versatility such as is not found in the Grand Central Palace show, where you see great numbers of manufacturers flocking after a certain design and where production features must be kept uppermost. Rolls-Royce has its exclusiveness. So has Brewster. So has Rubay. So has Locke. So has Brooks-Ostruk. Collectively they constitute our school of design.

Rolls-Royce has a touring car design, a cabriolet, a limousine and a touring car with disk wheels. The Rolls-Royce straight-line radiator is in all, and they are all immediately recognized as Rolls-Royce, but the body conception in each is worked out along its own lines. This is where the brains back of the design appear. This is where designing genius exhibits itself. It is not blind copying. It is not converting a touring car into a limousine by adidng a permanent top. But it is creating each model as a unit.

One characteristic which is very general with these exclusive designs is that two spare wheels are bedded in the front fenders. These designers rarely like to carry the spare wheels on the rear. They agree it is impossible to get a smart-looking design. They generally admit that

Above is a Rubay body on a Locomobile chassis which has cane sides and rear. An unpleasant feature of the design is the sharp toe or angle in which the cane ends at the cowl. Above it White roadster with folding rear seat, Rubay design. The top folds entirely out of sight. This is a good example of the practical roadster type. At right, Locomobile with hinged center cowl carrying windshield. This form of center cowl has an attachment similar to a bonnet attachment which holds it firmly down on the top of the body. It gives the rear seat passengers as good protection from the wind as does the front windshield. It is a highly desirable design in that there is no reason why a person who buys an expensive touring car and pays for its maintenance should not have as much comfort and protection as is afforded the driver. Note the cowl tilted



carrying the wheels beside the engine adds weight to the front end, but they aim at a distribution of weight over both axles by spring suspension in touring car models, and by body design in inclosed types.

The shape of the lamps and the mounting of them with relation to the radiator is generally a part of the design. Rolls-Royce rarely uses the same shape of lamp on a convertible that it uses on a touring car. In the touring car it carries a flat type close up to the top of the radiator, giving a compact appearance, whereas on a convertible or limousine it uses a cone shape or egg design of lamp and carries it low down on the radiator. With the Rolls-Royce the lamp means as much a part of the design as the neck-tie is to the dress in general.

Center Cowl Unpopular

The center cowl, or the cowl back of the front seat, is not popular with custom designers, although it originated with them. When they use the wooden cowl back of the front seat they invariably hold it as low as possible and do not let it rise 5 or 6 in. above the top line of the body. When it rises high above the body side, it gives a high appearance to the body, which is not desirable these days. On the other hand, if you maintain from front to rear the top line of the body and do not let it be destroyed by the center cowl, you secure a low effect, which is highly desirable. Note how this side line is carried through on the cubist design of the Murray illustrated herewith.

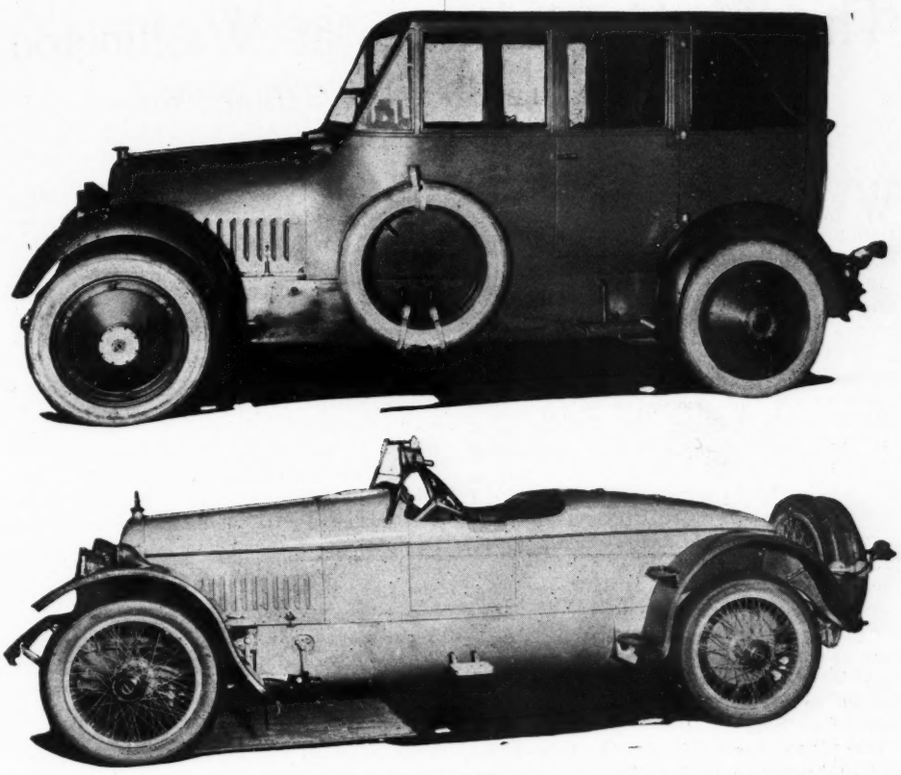
This same effective means of reducing height is carried out in the square line Brewster by the bead line, which extends from the top of the rear fender straight forward to the radiator. This line might be described as the optical illusion line, in that it has a magical effect of giving length to a design and correspondingly reducing height.

The harmony of lines, etc., is carried out in this Brewster by the compact carrying of the spares at the rear, and carrying them practically vertically to parallel lines of the body. They look a part of the job rather than an attachment. These spares might have been carried at an angle parallel to the lower part of the rear, but this would have created a jargon of lines which the designer aimed to eliminate.

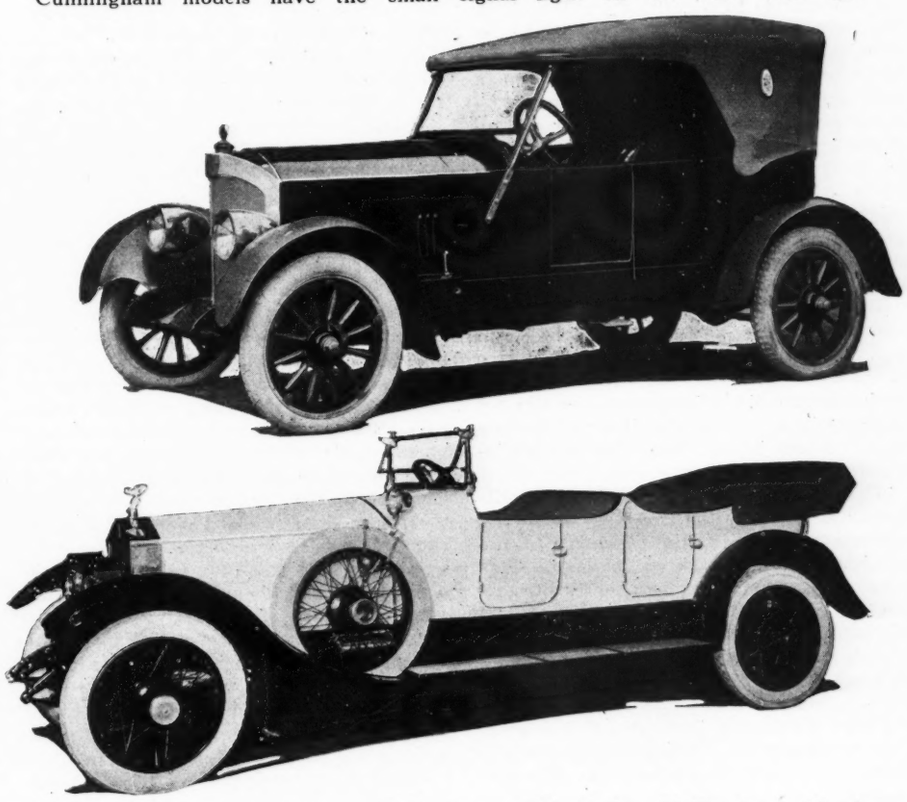
While the salon each year shows a number of designs without running boards, they are essentially city jobs, and every designer admits that the running board is essential to the touring car for general country use. Leaving off the running board in city jobs offers good scope to imitate carriage lines which must be credited with good artistic effect. There was in America a good school of carriage design, and about the only opportunity it has of exhibiting itself in the motor field is in these shopping cars that are so fashionable with the women.

New Salon Mark

The salon has set a new mark for itself in its de luxe program, which is one of the finest ever issued in America in connection with a motor show. It is a combination of art designs and advertisements of the exhibitors. Each is done in many colors, and the book carries with it the atmosphere of exclusiveness created by the car designs.



Daniels' closed type, above, showing effective use of disk wheels with individual fenders to match and elimination of the running board. The single entrance is satisfactory for a four-passenger single compartment design of this type. Cunningham roadster, below, with individual fenders and no running board. The heavy underpan lends a highly torpedo effect to the general outline. All Cunningham models have the small signal light on the front like this



Mercury touring car, above, made by Mercury Cars, Inc., Hollis, Long Island, N. Y. It is a four-cylinder design with 114-in. wheelbase, and is one of the few touring cars shown without running board. The spare tire is skillfully concealed under the rear seat. Rolls-Royce touring car, below, in white, with straight-line radiator and combination curve and straight-line tonneau. The large curve of the front fender is but one of the good features of this design, which would be impossible to copy for production manufacture. Note how the top folds

The Week's Activities at Washington

Changes in Council and New Cabinet Member Proposed—Aircraft Board Optimistic

WASHINGTON, Jan. 5—Congressional investigation of the Council of National Defense, new bills for revising the Council, suggestions for a Secretary of Munitions and optimistic reports from the aircraft board mark the most important events of the week.

The Congressional investigation, pursued mainly by Congressmen McKellar and Chamberlain and Weeks, though not conclusive in its findings, has resulted in a bill by Congressman McKellar demanding that officials of the Council be men not in any way affiliated with companies engaged in or seeking war work. It is a bill that carries many possible dangers with it. It plans to pay large salaries in place of the present $1 per year. It plans to place men in charge of departments of purchasing power whose main qualification is that they are not connected with the industry regarding which they must be familiar enough to place orders running into millions of dollars.

One plan suggested is that the large salaries that may be paid will secure experts in each line willing to give up their present positions. This sounds reasonable, yet several obstacles to efficiency stand in the way. First it is likely that a man giving up a position to join the Government forces may be unable to withstand his friends in the industry. Second, the men to be secured as experts will be appointed by the Director of the Council and such a plan will allow for political pressure, for partisanship, for petty politics and for the installation of politicians in place of experts as the buyers for the Government and its allies, regardless of whom the director might be for, as past experience has shown appointive positions plus large salaries always mean politics.

Might Oust Horning

If Senator McKellar's bill is passed it would mean the discharge of H. L. Horning, now in charge of the automotive section. It would not take away men like Julius Rosenwald, whose companies are not engaged in war work, but it would remove every expert in any line who has affiliations with his industry.

The bill by Senator Chamberlain calls for an addition to the President's cabinet, a Secretary of Munitions similar to the Minister of Munitions of England. This plan is expected to remove present purchasing difficulties, to co-ordinate all buying.

Judge Lovett, whose priority orders were suspended last week, requests that a statement be made to show that reports testifying that his priority orders caused congestion of freight are untrue. Judge Lovett states that the congestion was actually caused by an old tag system designed in the Mexican war and used until recently by the War Department. During the Mexican trouble railroads issued blue tags to the War Department to be placed on all war shipments to get preference for them in transportation. Every clerk was given hundreds of these tags. When the world war developed these tags were in the hands of clerks who have used them until recently upon every package or freight car that was in any way connected with war work. This, according to Judge Lovett, has been the real cause of a considerable part of the freight congestion.

The Council of National Defense through its committees is attempting to find a solution to present and future war labor problems. In an interview this week, W. S. Gifford of the Council stated that he believed the labor problems of the war were not connected with the usual routine of the Department of Labor and that the Council committees are working independently of the Department. At the Department of Labor this last week it was stated that the Department knows fully the existing and coming labor problems and is prepared to care for them efficiently. Interesting in view of this comes the report from the Shipping Board that it plans to send speakers about the country to get workers for the ship yards by an appeal to the patriotism of the workers.

The Aircraft Board, according to Howard E. Coffin, is making all the progress that can be expected, and is up to its schedule in every instance. Mr. Coffin is very optimistic of the great part our country will play in the war with its huge fleets of airplanes. In an interview this week he stated that most of the contracts for aircraft work now are being placed in the Middle West to avoid the freight congestion that accrues when too many orders are placed in the East. He told that ten training planes are being produced daily in this country now and that thousands of the highest class of men are being given flying instructions on American fields. At first we sent many of our potential flyers to France, but recent advices from that country were to the effect that they had as many men as could be properly cared for and as a result the numbers training in this country are increasing rapidly. Training machines also were being shipped abroad and to other countries for some time, but these too are now being used at home since the foreign countries advised that they have received a sufficient number for the time being.

All eyes are turned toward the new railroad dictator and many are wondering what the result of his activities will be. They seem entirely constructive up to the present. Plans are being made for building up the roads, the freight cars, the locomotives and the various warehouses and docks and terminals, and up to this time nothing has been said that would indicate a negative or tearing down or "cutting-out" policy. It is most certain that at times and possibly often war work will have to have the right of way and we may see priority orders issued again in the future allowing fuel, munitions or food priority over other materials or articles.

The third Liberty loan probably will be issued in February, and no doubt will have some effect on busines and on the credit inflation of the nation. Many people in Washington are in favor of larger taxes on incomes and other means of producing the money required for the war in preference to the Liberty loans, which they claim tend to create inflation of credit which grows tremendously with each issue.

COUNCIL REPORTS ON WORK

Washington, Jan. 7—Reporting on the work accomplished by it from March 3, 1917, the date of its inception, to June 30, 1917, the Council of National Defense, in its annual report to Congress, recounts the following accomplishments:

Progress in standardizing specifications for tools and implements used in the manufacture of munitions.

A campaign to assist commercial business during the period of the war.

Motor transportation facilities developed.

Co-operative electric communication and transportation enlisted.

The coal industry organized for more effective production and distribution.

The effective enlistment of labor attempted through organizing labor leaders jointly with representative employers and civic and industrial leaders.

Scientific research promoted.

The war efforts of women centralized.

Liberty engine, relief of shortage in spruce and linen, elimination of foreign royalties and the development of the airplane industry.

In the report the work of the Committee of Supplies is especially praised for its great saving to the Government under unusual difficulties.

DEMOCRACY AS USUAL

New York, Jan. 8—Special telegram—The motor car industry is more interested in having democracy as usual after the war than business as usual now. This was the stirring remark of Hugh Chalmers made at the motor truck manufacturers' convention in the board room of the N. A. C. C. to-day.

The keynote of the meeting was service to the Government. This service was expressed in co-operating with the Government motor truck program in assisting to relieve the railroad congestion by the use of motor trucks and the additional service of the motor truck industry so that manufacturers may better understand the demands to be made upon them and be better prepared to meet them. The meeting was opened by a short address by Charles Clifton, president of the N. A. C. C., who spoke of the great necessity of co-operation toward national service and particularly of the great part which the motor car and motor truck industry already have played in helping the Government prepare for the great problem of meeting the Germans.

A startling statement of H. L. Horning was to the effect that there is an overproduction of gasoline to-day of more than 1,000,000 gal. a day. Mr. Horning, in his official capacity in Washington, already has been in receipt of many inquiries from motor truck manufacturers as to obtaining priority orders for shipment of goods en-

tering into motor truck manufacture and brought out the fact that notwithstanding that these makers have A1 priority orders they could still not get materials. In his opinion the remedy for this difficulty lies in the motor truck establishing its status as a national necessity. If motor truck makers can prove to the Government the necessity for using more and more motor trucks to relieve the freight congestion and can actually relieve it, the status of the motor truck will be firmly fixed and there will be no question as to the various makers getting efficient material to produce their vehicles in the number required.

The meeting was attended by almost seventy-five of the most prominent and largest motor truck makers in the United States, in addition to other Government and semi-government officials entrusted with National transportation problems.

A TRUCKS REACH CAPITAL

Washington, Jan. 4—The three sample class A standardized war trucks, assembled by White, Denby and Autocar and driven overland from the factories, arrived in Washington in good condition. The trucks with load averaged 5.3 m.p.g., and 17 m.p.h. Governors regulated the speed between 13 and 17 m.p.h.

The truck assembled by Denby made the overland trip in nine days; the one assembled by White at Detroit seven days, from Cleveland, Ohio, to Washington, while the one asembled by the Autocar Co., Ardmore, Pa., required five days for the trip. The Denby picked up the White at Cleveland, and these two picked up the Autocar, so all three arrived at once.

TO BUILD ONE PLANE

Washington, Jan. 5—It takes the following list of materials in the amounts noted to build a single airplane of the more simple type, according to figures compiled by the aviation section of the Signal Corps. This, of course, is exclusive of all the materials necessary for the engine.

Nails	4326
Screws	4326
Steel stampings	921
Forgings	798
Turnbuckles	276
Veneer, square feet	57
Wire, feet	3262
Varnish, gallons	11
Dope, gallons	59
Aluminum, pounds	65
Rubber, feet	34
Linen, square yards	201
Spruce, feet	244
Pine, feet	38
Ash, feet	31
Hickory, feet	1½

MAY CENTRALIZE PLANE REPAIR

Indianapolis, Ind., Jan. 7—According to information received last week from Washington all the army airplanes east of the Mississippi river and north of the Ohio river that are in need of repairs are to be brought to Indianapolis, where an airplane warehouse now is being constructed at a cost of $600,000. The main building to be used for the repair of airplane bodies is 241 by 264 ft., and a smaller building which is to be used for the repair of engines is 139 by 294 ft. Four large barracks are to be built to house the twenty-five officers and the 700 enlisted men who will have charge of the work.

Navarre Plans to Fly Across Ocean

Aviator Would Make 2500-Mile Flight Over Atlantic in 30 Hr. in Powerful Plane

PARIS, Dec. 22—Jean Navarre, who, until his mad exploits which brought him in contact with the Paris police, was the best aviator France possessed or ever had possessed, has just announced his intention of making a flight across the Atlantic. For several months now Navarre has been in disgrace. After his foolish escapades in Paris he was brought before the military courts, where it was pleaded that he was not in full possession of his mental faculties, the solution of the matter being his discharge from the army. According to l'Echo des Sports, in which journal Navarre has confided, the famous aviator is completely cured of his youthful wildness and is determined to retrieve his reputation by a sensational flight from the southwestern point of Ireland to Newfoundland.

In the present stage of aviation a flight across the Atlantic is just within the range of possibility, but the risks are so great that it needs a man of the daring and audacity of Navarre to make the attempt. Two methods are possible: a fast, light, scout type of machine capable of an average speed of more than 125 m.p.h.—such machines exist—and a big slow machine, of the Handley-Page, Gotha or Caproni type, averaging between 80 and 90 m.p.h.

Navarre is in favor of the latter type of machine, which he considers should be fitted with four engines of 300-hp. each and should carry three men, who will be both pilots and mechanics. The shortest route across the Atlantic is about 2500 miles; thus, with an 85-m.p.h. machine the flight would last 30 hr. and each of the three men would undertake two periods of piloting of 5 hr. each. After the first 5 hr. at the wheel, the pilot would look after the engines for 2½ hr., then rest for 7½ hr., and at the end of this time would take his place at the steering wheel.

The weight of the machine, with supply of fuel, oil and provision for a flight of this length is estimated at 12 tons. It is intended, at the outset, to use all four engines. At the end of 10 hr., when the consumption of fuel will have reduced the total weight to 9 tons, it is intended to run with three engines, thus maintaining the same average speed with a lower consumption of fuel. At the end of another 10 hr., when the weight will have reduced to 6 tons, a second engine will be stopped, and the flight finished with two engines only, developing 600-hp.

The machine will be a biplane-hydroplane with two of the engines carried in the fuselage and one each to left and right, on the wings. The bearing surface will be more than 3000 sq. ft., the wing span about 108 ft.

JACKSON MUNITIONS CORP.

Jackson, Mich., Jan. 5—The Jackson Munitions Corp., formed by local manufacturers and business men and incorporated for $500,000 to manufacture shells, has practically secured a $5,000,000 Government contract. Mayor William Sparks of the Sparks-Withington Co., prime mover of the organization, will spend next week in Washington completing the arrangements, and after his return the board of directors will be elected. Arrangements are about complete to use the plant of the Mutual Motors Co. for the manufacture of large shells, and that of the Jackson Automobile Co. for smaller shells. The smaller industries in the city also will receive proportionate parts of this and other contracts. It is stated that the Government desires the $5,000,000 contract completed by next September. At present about thirteen of the Jackson factories are engaged in Government work.

COMMITTEE ROUTES TRUCKS

Washington, Jan. 7—Special telegram—The Highway Transport Committee is laying out a route directly between Buffalo and the seaboard. At present three routes are being tried out by Captain Butcher of the engineer corps and Raymond Beck, head of the touring division of the B. F. Goodrich Co., who has been let to the committee for this work. The New York state highway department is co-operating with the committee and sending a state road inspector along besides having district road inspectors accompany party through each respective district.

The truck train of forty-two trucks driving overland from Buffalo to a point near Washington will pass through Poughkeepsie, N. Y., to-night. This huge train is driven overland under the direction of the engineer corps owing to inability to secure freight facilities for shipping the trucks. The Highways Transport Committee is directing the route.

DE JARNEY TO ADDRESS S. A. E.

Washington, Jan. 7—Special telegram—In the absence of Gen. Chauncey B. Baker, Capt. M. de Jarney of the French purchasing commission will address the Society of Automotive Engineers at the banquet in New York, Jan. 10. Captain de Jarney is a man well versed in motor car work, an owner of a large motor car plant in England, and has seen two years of active war service in French army in artillery division. General Baker is unable to be present because of illness.

HOLLEY BROTHERS REORGANIZE

Detroit, Jan. 7—The Ford Motor Co. is taking over that part of the Holley Brothers Co. used in the manufacture of carbureters for the Model T car. The Holley Brothers company is reorganizing as the Holley Kerosene Carbureter Co. and will manufacture the new kerosene carbureter recently announced, together with the regular carbureter models.

EDITORIAL PERSPECTIVES

Fastidious Dame Nature

IT is as impossible to expect the styles of motor car bodies to pass unchanged from year to year as to expect no difference in the spring and fall fashions in women's hats or changes in the derby hat worn by men from year to year, or the fashion seen from season to season on the stage. Exteriorly, the motor car is invariably part and parcel of the owner. It is almost as irritating on the owner to have a necktie that is out of date as to have an obsolete car. Even dependable, reliable service in an old-fashioned car is often overbalanced by some earmark of design which stamps it as an old model.

THIS characteristic of human nature is generally demonstrated in the Grand Central Palace show of this year. The old streamline talk of two years ago has been superseded by a new streamline argument. Today it is the streamline with a sharply defined beveled edge, or the straightline idea, as many term it, whereas two years ago it was a streamline obtained by a continuation of curves in which not the semblance of a clearly-defined beveled edge or straight line could be obtained. Then the radiator was a combination of curves to work into the body style; to-day the stylish radiator has straight-line edges and these work into the straight-line edges of the car equally as satisfactorily as did the curved design.

THE straight-line body, with its sharp corners, and beveled edges, can be rightly designated as our first war fashion. It is not any more expense to manufacture than the curve design and buyers like it. It is new. Exhibit spaces filled with cars exhibiting this straight-line idea engender a spirit of newness, improvement and progress and give to the chassis a halo of mental study lacking in many exhibit spaces where the exterior lines are practically as they were a year ago. There is a psychological power in this alteration of design. It is a potent selling factor.

IT is fortunate that many makers have brought out this new design. It is very fortunate that there is such a large number of new models seen for the first time at the show and not heretofore disclosed to the public incorporating these clearly defined straight edges. It is also fortunate there are quite a few models fitted with massive appearing disk wheels which lend a savor of newness and further mental study to the motor car. Incidentally they add a little war-like atmosphere in that you see in them a striking resemblance to the shield of mediaeval war days.

IT is fortunate that so many makers have brought out the sport four-passenger model. It has a good appeal from its attractive lines; it appeals as an economical war model with its reduced weight and seating capacity for four instead of five. It is better that there should be a good sprinkling of new models than too many limousines, sedans and coupes.

IT is fortunate that so many makers have seized upon the value of color as a stimulant in war times. There are perhaps half a dozen exhibits in which there is not one black model. There are light grays and dark grays, Brewster greens and other greens, reds, oranges, yellows, blues, carmines, buffs, khakis, etc. All help to buoy up the spirit of the attendants. All help to drive away and dissipate the mental cloud. Since the war the motor car has been a good reliever of depression which must be driven out of the mind in these days when increased efficiency is the essential rather than downcast spirits. This show is a good mental tonic, and when you think of the wonderful part the motor car and the motor truck are playing in the war you cannot but feel pleased and congratulate the manufacturers that in their color scheme and body design they have provided a good mental stimulant. When this can be accomplished without adding to the price or deteriorating the quality it is highly desirable. It should be done.

Government and Cars

WE congratulate Samuel A. Miles, the Barnum of motor car show management in America, on his selecting Governor Charles S. Whitman of the state of New York to open the show with a short speech from a rostrum in the middle of the grand court of the Grand Central Palace. It was good politics. Incidentally it was good advertising.

TO-DAY Government and governed are marching arm in arm in carrying out the burden we have to bear. It is no longer a case of a Government "down in Washington" and the governed or "the dear people" in New York, Chicago, Denver, San Francisco, New Orleans, Atlanta, Minneapolis or Texarkana. To-day the Government spreads over the entire area of country and every citizen, no matter what city he lives in, should be a part of the Government. The boundaries of Washington as a political center no longer are confined within the District of Columbia, but they embrace every business organization, every working organization, every charitable organization and every home and community. No citizen can consider himself apart.

FOR the first time Government came in and became part and parcel of the opening ceremonies of the great motor car show circuit of 1918. It was fitting that our first war show circuit should be opened by so important a personage as Governor Whitman, who is making a name for himself as a great war governor. True he is only a state governor, but the movements for state efficiency that he is setting forth can be copied in every other state and thus become an accumulation of national effort. Governor Whitman aptly epitomized the value of the motor car and its essential aspect when he declared that the present show was an answer to those who had been endeavoring to slander the industry by attaching the stigma of non-essential.

AFTER telling of the work done by the motor car on the French front, and referring to the present war as one of

"trenches and motors," Governor Whitman closed with the following sentence on which he placed the label of patriotism for all those engaged in the manufacture and merchandise of this great world necessity:

"WHEN WE REALIZE HOW GREAT IS THE CONTRIBUTION OF THOSE WHOSE LABOR AND WHOSE CAPITAL, WHOSE TIME AND ENERGY AND ENTERPRISE DEVOTED TO THIS INDUSTRY, TO THE CAUSE OF NATIONAL PREPAREDNESS AND NATIONAL DEFENSE, IN THE GREAT FIELD OF AVIATION AS WELL AS IN THAT OF TRANSPORTATION ON LAND, WE ARE JUSTIFIED IN SAYING THAT THOSE HERE AT WORK ARE ENGAGED IN PATRIOTIC SERVICE."

Unity in Design

WITH too many makers the design of the gasoline tank at the rear is not considered as it should be, and appears a stock design rather than one shaped to harmonize with the rear curve of the body. It is unfortunate when a manufacturer converts the rear of the body from a large rotund curve design to one of sharp corners and merely straight lines and spoils the complete effect by not altering the shape of the gasoline tank or the method of mounting the tires.

ART consists generally as much in careful attention to minor details as to major effects. It is another reiteration of "little drops of water making the mighty ocean" or "little grains of sand making the beauteous land." The well-designed body is as much a total of the properly worked out little details as it is of the general line from radiator to rear fender. One of the exquisite gems, if the expression may be applied to motor car body design, seen at the show, is a car in which every detail is made to harmonize with the general thought of the design. Thus, the shape of the body is a straight-line one with sharp, clearly-defined corners and angles. The door handles are straight-line with sharp corners; the umbrella holder, instead of being a plain ring is an octagon with sharp corners and straight edges; the tonneau clock is a hectagon with sharp corners and straight edges; the tonneau lights are irregular hexagons with sharp corners; the brackets to carry the spare tires are straight-line designs with sharp edges; the paneled wood work of the instrument board and the tonneau has sharp edges and straight lines; and the cut of the trimmings and upholstery breathes this same message of straight lines and sharp edges. The job en toto is a harmony and corresponds with the musical measure written in due regard to the mathematics of music. It is not a jumble. It is not a heterogeneous ensemble. It is a unit.

The Spare Wheel

BODY designers generally agree that the most attractive looking body is that in which the spare wheels and tires are bedded in the front fenders, one at either side. Those specializing on custom-made bodies exhibited at the Salon now running in the Hotel Astor declare that from the point of view of weight distribution the spare bedded in the front fender is not so desirable as when carried on the rear in that the weight of these is added to that of the engine, thus placing too much weight on the front wheels. In touring cars, which are frequently driven without rear seat passengers, this uneven distribution of weight is accentuated. There are some makers who aim that a more even distribution of this weight by the cantilever spring design and the point of attaching the front ends of the cantilever to the frame as well as the method of making this attachment.

FOR a long time there will be the two schools of designs in so far as the carrying of spare tires and wheels is concerned. The adherents of each school should aim at a desirable blending of appearance with good engineering practice and it is generally in the best compromise of these that the most satisfactory product results.

THERE is an opportunity for improvement in the design of both adherents. During the last year tire diameters were reduced, thereby making it easier to bed the extras in the front fenders. This method adds materially to the cost of the fender and calls for very robust construction. With the reduced tire size there is no lack of space in which to accomplish the job.

THOSE carrying tires on the rear should endeavor to support the tires so that they have the appearance of a part of the car rather than some bundle on the rear end. In some cases the rear body lines have a decided backward curve and the tires are carried so as to lean forward giving a conflict of lines that is not desirable. In others the rear body lines are practically vertical, but the line of the spare tires is 35 deg. from the vertical, thereby creating a confusion of lines of effect. The carrying of the spares should be considered a part of the body design whether at the rear or at the side. Some designers carry them too high on the side and they have the appearance of a coat suspended from a high hook on the wall, whereas others bedding the spares deep in the fender obtain a very attractive general appearance.

Winter Motoring

WE are in swaddling garments so far as efficiency in winter motoring is concerned. Requiring three weeks with a train of thirty war trucks to go from Detroit to Baltimore is sufficient evidence. The delay was due to snow and lack of means for removing it. War is going to demand that we devise improved means to keep many of our country roads cleared of snow during the winter. We do not mean that every highway and byway will be cleared of snow after every storm, just as we are supposed to clear our walks after the night storm; but we do mean that main roads for a distance of 50 miles from big population centers must be kept clear of snow so that motor trucks can transport their loads over such just as in summer time. The shortage of railroad facilities during the war is making this essential and once we get to it during the war we will not slip back after the war.

TAKE an example: The road from Chicago to Milwaukee should be kept open all winter so that motor trucks can handle freight not only in the 90-mile trip between these cities, but to intermediate points such as Waukegan, Kenosha and Racine. The motor car and motor truck makers in these cities can drive all their cars to distributers in these sections by road the year around. They will have to do this due to shortage of cars.

ANOTHER example: The 90-mile stretch between New York and Philadelphia must be kept free of snow the year around. Motor trucks from both cities will have to distribute and collect freight from all intermediate points. It is possible that a good portion of the 225-mile trip between New York and Boston may be kept open. The time is coming when it will all be kept cleared of snow. The same applies to the road between Philadelphia and Baltimore and between Baltimore and Washington. The same applies to main roads for distances up to 25 miles out of Minneapolis and St. Paul, if freight conditions demand it; and for similar roads outside of Kansas City, St. Louis, Detroit, Buffalo, Pittsburgh, Providence and a score of other cities.

Motor Mail Is Planned

Postoffice Outlines Rural Routes of 3000 and 4000 Miles for Parcel Post

To Connnect Portland, Me., and New Orleans by Service

WASHINGTON, Jan. 4—The installation of motor truck parcel post routes in various sections of the country, aggregating between 3000 and 4000 miles, is the ambitious plan of the Postoffice Department. It is expected these routes will be in operation within the next three months. One chain of motor routes will extend from Portland, Maine, to New Orleans. Another will cover much of a large stretch of territory in Ohio, Indiana, Illinois and West Virginia. On the Pacific coast routes will be established between San Francisco and Sacramento, via Stockton and Fruitdale, a distance of 125 miles, and between Redlands and Los Angeles, via Ontario and Pomona, Cal., a distance of 76 miles.

To Lower H. C. L.

It is the belief of the Postoffice Department that the operation of these routes, and others to be established, will materially aid in the distribution and in lowering the cost of food products. The existing law does not provide for the employment of Government-owned motor trucks on rural delivery routes, nor does it require the rural carriers to use motor vehicles. In the star route service, however, where the mail is carried under contract, a recent law permits the Postoffice Department to designate the sort of vehicles to be employed, and in awarding new contracts the department will specify that motor trucks shall be employed on all routes where the roads are such as to admit of their use. These contracts are advertised for bidders, and where payment asked for the service is deemed to be excessive the department is authorized to provide Government-owned motor trucks and to employ drivers for the operation of these routes.

The first Government-owned motor vehicle postal service was established in Washington in October, 1914. This service has been extended to Boston, Buffalo, Chicago, Detroit, Indianapolis, Nashville, Philadelphia, Pittsburgh and St. Louis, and according to schedule was to supersede contract service in Brooklyn and New York the first of this year. As an indication of the efficiency of this service, it can be stated that in one of the cities where it was in operation during one year, the motor trucks engaged in the transportation of mail between the depot and the postoffice were scheduled to make 384,526 trips, and there were only 132 failures, or one failure to every 2913 trips.

The operation of motor routes not only represents a more economical form of mail service to the rural communities but also permits of the establishment of a wider postal zone from the larger and more important trading and postal centers. This means a better supervision of the service and the extension of the local zone rate on parcel post from the larger towns to more families, giving them improved facilities for trading and at the same time increasing the utility of the parcel-post feature of postal activity. These are considerations that demand the most careful attention in these times of excessive costs for foodstuffs and other necessaries of life.

A considerable number of contracts have been awarded requiring the use of motor vehicles in the transportation of mails in the star route service, resulting in material reductions in schedule running time. By this means mail not only is delivered to many postoffices of considerable importance located on branch lines of railroad where trains do not arrive early in the day, or at points more or less remote from the railroad, considerably earlier than would otherwise be possible, but where rural delivery routes emanate from such offices the expedited schedules on the star routes have had the effect of causing the mail from surrounding cities to be delivered on such rural delivery routes 24 or 48 hr. earlier than formerly.

Operating under the law as it now stands as applied to the star route service, motor truck routes, some under contract and some operated with Government-owned motor trucks, are in process of establishment from:

New York to Port Jervis, N. Y., two routes, 86 and 84 miles; New York to Hammonton, N. Y., 114 miles; New York to Easton, Pa., 94 miles; New York to New Milford, Conn., 91 miles; New York to Hartford, Conn., 105 miles; Philadelphia to Easton, Pa., 56 miles; Easton to Reading, Pa., 51 miles; Pottsville to Easton, Pa.; Harrisburg, Pa., to Reading, Pa., 51 miles, and Harrisburg, Pa., to Hagerstown, Md.

Routes extend from Cincinnati to Springfield, Ohio, 76 miles; Portland, Me., to Nashua, N. H., 105 miles; Nashua, N. H., to Hartford, Conn., 127 miles; Hagerstown, Md., to Staunton, Va.; Staunton, Va., to Roanoke, Va.; Winston-Salem to Charlotte, N. C.; Concord to Statesville, N. C.; Charlotte to Camden, N. C.; Camden, N. C., to Columbia, S. C.; Florence to Columbia, S. C.; Columbia, S. C., to Chapin and Lexington, 70 miles; Charleston, S. C., to Columbia, S. C., 126 miles; Orangeburg, S. C., to Augusta, Ga., 77 miles; Savannah to Statesboro, Ga., 55 miles; Augusta to Macon, Ga.; Macon to Columbus, Ga.; Columbus to Montgomery, Ala.; Greenville, S. C., to Atlanta, Ga.; Atlanta, Ga., to Montgomery, Ala., and Birmingham to Montgomery, Ala., 106 miles.

With the exception of a branch between Washington and Richmond, Va., the course of which has not yet been decided on, a chain of routes has been adopted linking Portland, Me., with Nashua, N. H.; Nashua with Worcester, Mass.; Worcester with Hartford, Conn.; Hartford with New York; New York with Easton, Pa.; Easton with Philadelphia; Philadelphia with Oxford, Pa.; Oxford with Baltimore, Md.; Baltimore with Washington; Lynchburg, Va., with Winston-Salem, N. C.; Winston-Salem with Charlotte, N. C.; Charlotte with Greenville, S. C.; Greenville with Atlanta, Ga.; Atlanta with Birmingham or Montgomery, Ala.; Birmingham or Montgomery with Jackson, Miss. Routes will be established Jackson to New Orleans, La., and Jackson to Mobile.

These routes are now surveyed and are being advertised for bids. Where satisfactory bids are not received governed-owned trucks will be used.

The routes already in operation with government-owned trucks are from Washington to Leonardstown, Md., 54 miles; Annapolis, Md., to Solomons, Md., 65 miles; Washington, D. C., to Baltimore, Md.; Baltimore to Philadelphia, Pa., 110 miles; and Baltimore to Gettysburg, Pa., 53 miles.

Routes in the middle states will form a chain from Indianapolis, Ind., to Columbus, Ohio; Columbus to Zanesville, Ohio; Zanesville to Wheeling, W. Va.; Wheeling to Pittsburgh, Pa.; Pittsburgh to Uniontown, Pa.; Uniontown to Cumberland, Md.; Cumberland to Hagerstown, Md.; Hagerstown to Staunton, Va.; Staunton to Lynchburg, Va.

Further extensions contemplated but not yet surveyed are from Charleston, W. Va., to Columbus, Ohio; Columbus to Cincinnati, Ohio; Cincinnati, Ohio, to Louisville, Ky.; Louisville to Chattanooga, Tenn., and Chattanooga to Atlanta, Ga.

Fuel Lack Still Critical

Makers Operate Plants on Hand-to-Mouth Principle Owing to Shortage

All Michigan Suffers as Supply Continues Insufficient

DETROIT, Jan. 4—The fuel situation continues in a very critical condition and changes so much daily that it is impossible to clearly predict which way it will turn within the next two weeks. It is certain that if the orders issued by the state fuel administrator were insistent to the letter, many industries would be forced to close because of lack of fuel. These orders received by telegram are briefly as follows: That all emergency coal coming to the city be used to fill domestic orders first and any surplus be given to public utility companies and industries.

However, the representative of the state fuel administration in the city is interpreting this to mean that emergency shipments be supplied only for domestic use in case of severe need, and this is being done. It is the opinion of the local administrator that the hardship endured by the loss of pay due to closing down of the industries is worse than that by the lack of coal. Hence, though on some days domestic users receive all the coal supply, to date, with the exception of a few isolated instances, the manufacturers have been receiving enough to keep them running in a sort of a hand-to-mouth manner and this is the plan that will be followed unless the state fuel administrator necessitates a living up to the letter of his order. The situation is exceptionally critical and if cold weather persists will become more so, but it is the hope at present that the industries will be kept running in the future as they have in the past.

The shortage that exists in Detroit exists likewise throughout the state. The Briscoe Motor Corp. at Jackson was shut down two days last week because of lack of fuel. For the balance of the week the factory closed at 2:15 p. m. for the same reason. This week, however, the full time schedule has been re-established and a sufficient amount of coal is on hand for a short time.

The Olds Motor Works and the Reo Motor Car Co. at Lansing to date have not been affected seriously by the coal shortage, but both report that the situation is deplorable and that the future is not bright. The Oakland Motor Car Co., Pontiac, is in the same situation and the Grand Rapids concerns are, if anything, worse off than the rest.

CONDITIONS AMONG PLANTS

Chicago, Jan. 7—That business is not so bad as some would paint might be judged from the following news notes if from nothing else. For instances:

The Champion Ignition Co. has increased its production from 35,000 to 50,000 spark plugs a day and plans to increase this to 80,000 plugs a day in the coming year. This will necessitate an increase in floor

space and equipment and in the number of workmen employed. The Chevrolet motor Co. reports a large volume of business in the last year with its peak production in October. Indications point out that this peak will again be approached during the months of February, March and April.

The Dort Motor Car Co. with its Canadian associate increased its production about 100 per cent in the last year. In 1916 8000 cars were produced and it is expected that both plants will manufacture about 20,000 cars in 1918. The other automotive concerns, the Marvel Carbureter Co., the W. F. Stewart Co. and the Flint Varnish & Color Works, all report marked increases in the volume of business. The latter company states that the increase in the last year has been about 40 per cent and the nearly 500,000 cars have received their finishing coats from this plant.

The Hupp Motor Car Co. reports exceptionally good export demand from the Latin countries. It is stated that at present the active demand from South Africa would take 100 cars on immediate order and a factory man has been recently taken by the South African dealer to install a service and sales system. The demand from South America and Porto Rico is also good. At present the local production is far behind the demand and over 100 Hupmobile dealers in the states have not seen the new series R car. The production on this car is rapidly speeding up and at present about sixty-five cars per day are being manufactured. It is reported on reliable authority that the Hupp Motor Car Co. is working on special work for the Government.

The Maxwell Motor Co. is taking on tool designers, tool makers and die makers, and otherwise preparing for filling the Government contracts which it now has on hand. Due to the large amount of Government work at present being placed in production a premium is placed on this class of skilled labor and it is difficult to obtain it even then.

The daily shipments of the Reo Motor Car Co. average from 125 to 150 cars and many of these are being driven overland by the dealers themselves. Reo Co. is tooling up preparatory to the manufacture of tractors for the United States Government. It is stated that this work will not materially reduce the production of the Reo company, as it works in nicely with the equipment and labor at hand. About 3500 cars are on hand ready for transportation provided the equipment is available.

ABBOTT MEETS TROUBLE

Cleveland, Ohio, Jan. 4—An involuntary petition in bankruptcy was filed in the Federal Court Friday against the Abbott Corp., manufacturer of the Abbott passenger car. The petition was filed by the Hydraulic Pressed Steel Co., the Dunlap Ward Advertising Co., Detroit, and the Brown Auto Top Co.

Attorney Joseph Hostetler of Baker, Hostetler and Sidlow, attorneys for the creditors, said he estimated the assets of the corporation are estimated at $50,000 and the liabilities at about $200,000. A. W. Gardiner, secretary of the Abbott Corp., states that the assets will reach a much higher figure. Concerning the bankruptcy proceedings the statement of the company is that the plant has suspended operations temporarily and that it is believed the contemplated merger of the Abbott Corp. and the HAL Motor Co. still will go through. It is the plan of the company, when combined, to make the Abbott and HAL passenger cars, and bring out a new motor truck. The Abbott Corp. formerly was located in Detroit but moved into a new plant in this city about a year ago.

NEW LITTLE GIANT COMPANY

Chicago, Jan. 7—After nine years as a department of the Chicago Pneumatic Tool Co., the motor truck interests of the company were on Jan. 1 taken over by a new organization known as the Little Giant Truck Co. The Little Giant Truck Co. is owned and controlled by the Chicago Pneumatic Tool Co., and the officers are the same: W. O. Duntley, president; W. B. Seelig, secretary; L. Beardsley, treasurer; T. J. Hudson, sales manager. Headquarters are unchanged.

AVERAGE CAR OF 1918

The second and third paragraphs of the description of the average car of 1918, page 28 of the issue of Jan. 3, should have read, "The average American car for 1918, as based on a study of 650 body types carried on 180 chassis models as offered by 125 car makers, is a car with a six-cylinder, L-head, block-cast engine with a bore of 3.43 in. and a stroke of 4.94 in. Its wheelbase is 120.7 in., its tires are 34 by 4 and it sells for $1,822.

"A condensed description of the car, aside from the features mentioned, would point out that this bore and stroke give the engine a piston displacement of 269 cu. in. and its N. A. C. C. horsepower rating would be 27.4 in. at a piston speed of 1000 ft. per minute."

STEARNS GETS BRITISH ORDER

Cleveland, O., Jan. 4.—The F. B. Stearns Co. has received a contract involving several millions of dollars to manufacture airplane engines for the British government. It is a sub-contract of the Rolls-Royce Co., Ltd., and all but a few minor parts will be manufactured by the Stearns company. This necessitates several additions to the Stearns factories and a directors' meeting will be held this week to complete arrangements for enlargement. This contract will necessitate a slight curtailment of production of the Stearns-Knight cars, but car manufacture will not be discontinued.

Motor Age Recruits

Letters That Speak for Themselves

War Department
PERSONNEL DIVISION
Office of the Chief of Ordnance
WASHINGTON

ADDRESS ALL COMMUNICATIONS TO
ENLISTED SECTION, PERSONNEL DIVISION
1333 F STREET, NW.
WASHINGTON, D. C.

Editor Motor Age,
Mallers Building,
Chicago, Ill.

CRD-CDD
December 19th, 1917.

Dear Sir:

1. I am directed by the Chief of Ordnance to thank you for the very kind co-operation shown in running the story concerning the Enlisted Ordnance Corps, National Army, with photographs and full descriptive matter in Motor Age.

2. You will be interested to know that several hundred inquiries were received at this office, the direct result of this publicity. Owing to the press of official business immediately prior to December 15th, it was impossible to take action on many of these applications from skilled automobile men prior to the date in which enlistment could be accomplished.

3. It may be well to inform your readers that any man qualified may, under the new Selective Service Regulations, go before his local board, ask for induction into the military service and that he be transferred to the Ordnance Department for duty.

4. The assistance given by your publication in securing skilled men for the Ordnance Department is greatly appreciated.

Respectfully,
F. A. ROGERS, Captain, Ordnance Reserve Corps.

AIR
(Personnel) Volunteer Dept.
119 D St., N. E.
Office of the Chief Signal Officer

Editor (Motor Age) Class Journal Co.
Mallers Building,
Chicago, Ill.

December 14, 1917.

Regarding Recruiting Publicity.

1. It is with a great deal of pleasure this department can write of the results obtained by Motor Age in the recent recruiting campaign.

2. One hundred and ninety-six traceable inquiries were received from the publicity. This, however, does not begin to indicate the work accomplished, because the whole effort was directed to send men direct to their recruiting officers, and therefore there is no record of the number of men who took this course.

3. Accept the thanks and appreciation of the department for the splendid co-operation and also the congratulations of this department for the apparently great influence exerted by these papers upon the readers.

By direction of the Chief Signal Officer,
E. Z. STEEVER, Major, Signal Corps.

cd-smc

Design of European Aviation Truck

Specifications of New American 1½-Tonner Show Foreign Practice Has Been Followed

By W. F. Bradley

Special Correspondent of Motor Age in France

PARIS, Nov. 1—Although America has supplied thousands of motor vehicles of various types to the different Allied armies, some of the special machines required in the aviation service have remained almost unknown on the western side of the Atlantic. Flying squadrons in the field need three type of motor vehicles —a truck of 3 or 3½-ton capacity differing only in a few details from the standard Quartermaster truck; a fast pneumatic-tired 1½-ton truck and cars for officers' use.

The specifications recently issued by Washington on the 1½-ton aviation truck show advantage has been taken of European experience, for the type asked for corresponds to that in use in France. A truck with a load capacity of 1½ tons fitted with pneumatic tires capable of maintaining a road speed of 30 m.p.h. and designed to operate on very frequent occasions with a trailer is quite foreign to American peace conditions. Even in Europe the type was little used before the war, but it has now been developed to such an extent that in the French army the 1½-ton type is employed exclusively with the squadrons, the heavier 3½-ton truck being found only with the parks back of the squadrons.

U. S. Truck

So far as the engine is concerned no serious criticism need be brought against the American specifications. It is doubtful, however, if a governor really is needed on a truck of this type. These vehicles operate more often singly than in convoys and frequently have to be driven to the limit, the general conditions of operation more closely approximating those of staff cars than of the regulation trucks. The only useful role of the governor, therefore, would be to prevent the drivers racing their engines on down grades.

Worm-gear axles have not been employed extensively for this class of vehicle in Europe, the great majority having straight bevel. No objection need be brought against the worm-gear axle, provided sufficient clearance is provided, for all aviation vehicles are called on at frequent occasions to operate more or less across country. The final gear ratio of 7¾ to 1 is much lower than generally found necessary in Europe. The lowest here is 6 to 1, while many vehicles have 5¼ to 1 and find this satisfactory. It should be remembered that aviation camps are a certain distance back of the lines, where good roads are available and where a high average speed can be maintained. Although it is necessary at times to work away from made roads, conditions are such in France that aviation tractors do about 90 per cent of their work on made roads, over which they can run at high speed.

The provision of artillery wheels and different-size tires for front and rear wheels is open to very serious criticism. All European war experience has been against the wood wheel, which is weaker than all-metal types, deteriorates rapidly and is easily damaged by fire and shell. For fast tractor work the demountable steel disk wheel has proved itself ideal under the most trying conditions. The fitting of two-size tires is an elementary mistake which should have been impossible at this date. Efforts have been made by the various European armies to reduce tire sizes to the smallest possible number, and nowhere is it permissible to have two sizes on the same vehicle. Even the modest Ford only goes into service after the front tires have been changed to correspond with those on the rear wheels. The ideal equipment for a 1½-ton aviation tractor is 34 by 4½, singles on the front, duals on the rear wheels. These are quite adequate for the load to be carried. One precaution to be observed is that the duals should be as close together as possible to prevent stones from finding a lodging place between the tires and thus damaging the walls. With duals the tendency to skid is reduced enormously; it is also possible to work in snow with a much greater degree of safety than when single tires are made use of.

Two spare wheels, without spare tubes, are all that is required, for it is always possible in a case of emergency to run without load with one of the duals punctured.

Another advantage of this combination is that 34 by 4½ tires are quite suitable for the trailers employed in very large numbers by the airplane squadrons. With interchangeable tires and wheels there is not only an initial economy but saving in operation. Tires considered unsafe for the tractor can be put on the trailer. Further, 34 by 4½ is a tire size which could be adopted with great advantage for the officers' cars employed by the service. Thus, with the exception of a few of the very powerful and fast staff cars, the entire aviation service could be equipped with a single size of pneumatic tire. In drawing up the specifications the value of standardization from both a manufacturing and the user's standpoint appears to have been completely lost to view.

Type of airplane tractor most extensively used in Europe. It has steel disk wheels, dual tires and is a Fiat

Need Rear Tow Hooks

In addition to the ordinary tow hooks at the four corners of the frame, every aviation tractor should be equipped with a central spring-mounted tow hook at the rear, attached to specially strengthened cross frame member. This may have been provided for in the American tractor, but it does not appear in the published specifications. It is found that this type of tractor is most suitable with fixed sides, a swinging tail board and bows receiving a canvas top, thus making it possible to use it as an open truck or as a fully closed vehicle. Its greatest use is closed, but occasions arise when the tractor has to be employed without the bows and the canvas top.

A greater variety and more trailers are required in the aviation service than in any other branch of the army. The most common types are:

Two-wheel trailer, load capacity 2500 lb., dimensions about 14 by 6½ ft., with wood sides and canvas top, making it a completely closed vehicle, fitted with dual pneumatic tires 34 by 4½.

Two-wheel platform trailer, platform type, overall length about 23 ft.; pneumatic tires 34 by 4½.

Two-wheel platform trailer with bows and canvas top, overall length about 30 ft. with special internal fittings to receive wings; pneumatic tires 34 by 4½.

Two-ton, two-wheel trailers, some with demountable sides and solid rubber tires and some with canvas top.

Three-ton, two-wheel trailer, with de-

mountable sides and solid rubber tires.

Big four-wheel platform trailer on solid rubber tires, platform length not less than 30 ft.

In addition there are required gasoline tank trailers, kitchen trailers, workshop trailers fitted with hand tools, workbench with vises and a portable breast drill, and various photographic and telephone trailers. The first three trailers are the types required in largest numbers and are used behind the fast 1½-ton tractors. The first type carries general supplies, such as propeller, landing gear, turnbuckles, wire, instruments, etc., and really acts as first aid to airplanes on active service. Hitched behind one of the fast tractors, it can be rushed out to any place where a machine happens to be down to give immediate assistance.

Repair work in the motor service is entirely different from that in the general motor service. The most successful plan appears to be to attach to each squadron in the field a traveling motor workshop fitted with power-driven lathe, drill press, emery wheel, band saw, forge, acetylene-welding equipment, benches with vises and a complete equipment of hand tools for both wood and metal working. Such a shop generally is accompanied by a trailer carrying a supplementary collection of tools. The most satisfactory method of working is for the workshop to be ready at all times to go out to the assistance of any machine brought down back of the lines and carry out repairs on the spot. By keeping the workshop mobile and carrying out repairs in the field as far as possible, a considerable saving is effected, for it usually happens that a damaged airplane is damaged considerably more when it becomes necessary to demount its wings, put it on a trailer and tow it to the park.

U. S. MOTORIZES 124TH F. A.

Houston, Tex., Jan. 7—The United States has motorized the 124th Field Artillery, one of the light artillery regiments. Hereafter officers will work from five-passenger cars, and the reconnaissance and scout work of the regiment will be done on motorcycles and with side cars instead of on horseback. Motor trucks will haul the guns from place to place, and the men who under the old horse regime rode on the cannons will mount motor trucks instead.

MONROE DECREASES PRICE

Pontiac, Mich., Jan. 4—In spite of the soaring cost of making cars, the Monroe Motors Co. is decreasing its price. The model N-6 four-cylinder touring car previously cost $1,095, and this has been reduced $100 for the coming year. The sedan body, mounted on the same chassis, sells for $1,850. The reason stated for this decrease is that an increased production renders the reduction in price possible.

PRICES ON KING MODELS

Detroit, Jan. 7—The King Motor Car Co. has announced the following prices on its models: Seven-passenger touring, $2,150; four-passenger foursome, $2,350; three-passenger roadster, $2,150; seven-passenger convertible sedan, $2,950. Wire wheels are extra on all except the foursome.

Illinois Still Talks Road

Boosters to Meet and Plan Campaign on $60,000,000 Bond Issue

To Build After War, Says Governor of State

CHICAGO, Jan. 4—Officers, directors and members of the advisory committee of the Illinois Highway Improvement Association will meet at the Univedsity of Illinois Jan. 18 in connection with the proposed $60,000,000 good roads bond issue. The meeting will be held at the close of the highway short course of engineering at the university, which begins Jan. 14 and lasts five days, and is a course designed to bring together engineers, contractors, material men and citizens generally interested in the details of construction and maintenance of roads. It is a particularly apt time for such a meeting as this of Jan. 18 will be, as the course is intended to bring increased efficiency and saving in the expenditure of state funds for the construction and maintenance of roads. Road economy has been recognized as a vital part of the successful waging of the war, and it is a point to prove to the voters who will take action on this issue this year that such a matter is not out of order at this time. That there will be no attempt to market the bonds until the close of the war is evident in Governor Frank A. Lowden's statement, which is:

"Even if these bonds are voted next fall and this war is still on, I would not think, as governor of this state, of trying to market those bonds immediately or of starting immediately to build these roads, and I do not think anyone else would think of that. While this war is on, so far as I can see, you would not get the labor without paying prohibitive prices, and you would not get the material without paying prohibitive prices. Anyone will tell you that if we had to build these roads now, with the present prices of road materials and with the present prices of labor, the $60,000,000 would not begin to build the roads which are planned.

"But most of the economists I have read predict a very serious business depression when our troops are released from the trenches and come back home, with the cessation of all these multiform activities which have come as a result of the war. Many men will be thrown out of employment as a result; building material will be vastly cheaper. You will, therefore, not only build the roads much cheaper than you would now, but you would also help to hold things steady by furnishing much needed employment to labor that otherwise would be idle.

"I am willing to go upon record as saying that if the good roads bond issue is approved by the people next fall I shall not attempt to market the bonds or to begin this work until the close of the war."

The committee on preservation of highways of the Illinois association, which was authorized at the annual meeting, Oct. 4, will make its initial report at this meeting, and further plans for the conduct of the educational campaign in support of the good roads bond issue will be considered.

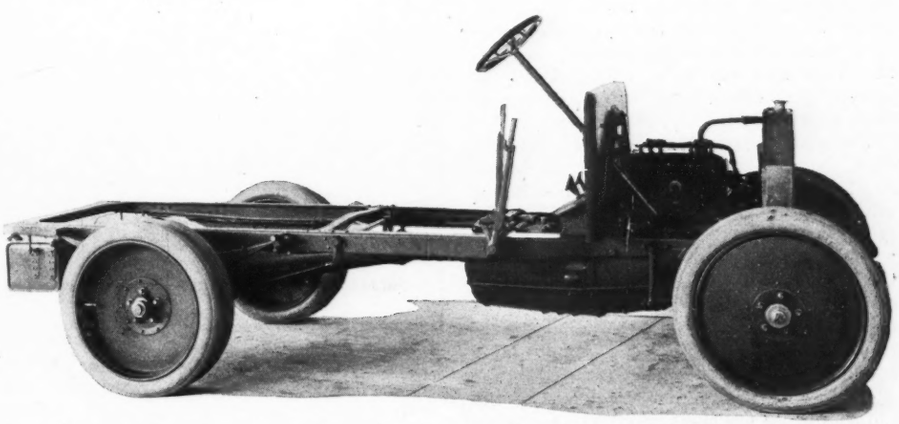
The road system which this bond issue would make possible gives the entire state permanent means of road communication throughout. The system was outlined in detail on a map and otherwise in the Aug. 23 issue of MOTOR AGE.

NO GASOLINE SHORTAGE

Washington, Jan. 5—The impression here continues to hold that there will be no regulation of crude oil or gasoline prices. The Government is obtaining at satisfactory quotations all the oil it needs, and A. C. Bedford of the advisory committee on oil believes that a gasoline famine now is impossible and that motor vehicle fuel may be used without curtailment.

NEW R & L ELECTRIC

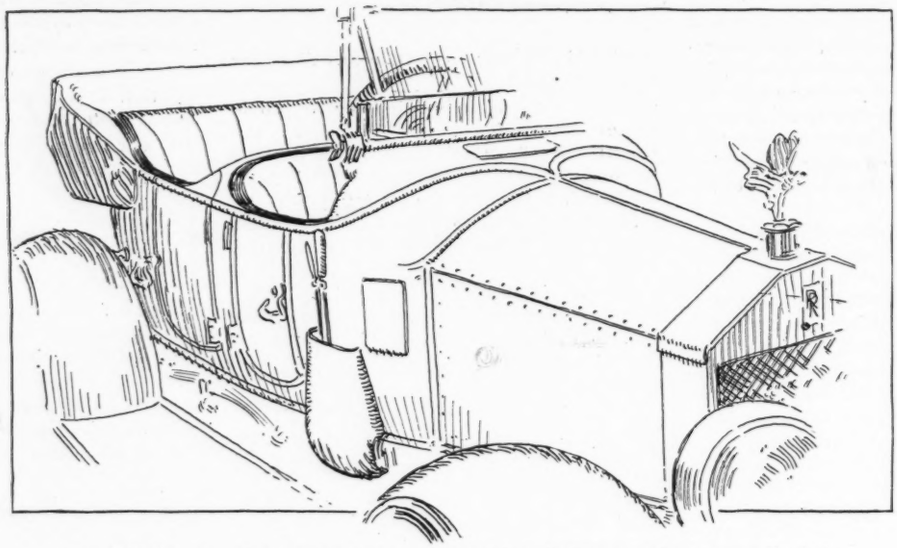
Cleveland, Ohio, Jan. 4—The Baker R & L Co., manufacturer of the Rauch & Lang electric car, announces a new model chassis styled the W-42. This chassis has a wheelbase of 142 in. with a radiator hood and new body design. The construction of the chassis is practically the same with several improvements incorporated including a more powerful motor. Three body styles are offered, the touring car, sedan and limousine.



The chassis of the special airplane tractor illustrated on the opposite page. Note the rugged construction throughout

The Straight-Line Design

Fashion Factor at Grand Central Palace Is Sharp Angles and Bevel Edge with Disk Wheels Giving Military Touch



Straight-line, bevel-edge body design created by Rolls-Royce and so generally imitated by many makers this year

STRAIGHT-LINE effects are to have the call in body design this year. This idea, developed by Rolls-Royce, which has been in process of development for the last several seasons, is much more pronounced in the new cars which are to be seen at the Grand Central Palace. Sides are straighter, hoods are higher and the hood line and cowl are more nearly horizontal.

The radical departure from previous practice is the quite general use in the more advanced body of a conspicuous bevel on the upper portion of the side panels. This bevel turns inward at a sharp angle, which if continued would meet above the center of the car. This idea has been noted in some of the custom body jobs of previous years, but this year marks the general incorporation of the design in production models on this side of the Atlantic.

One of Best Examples

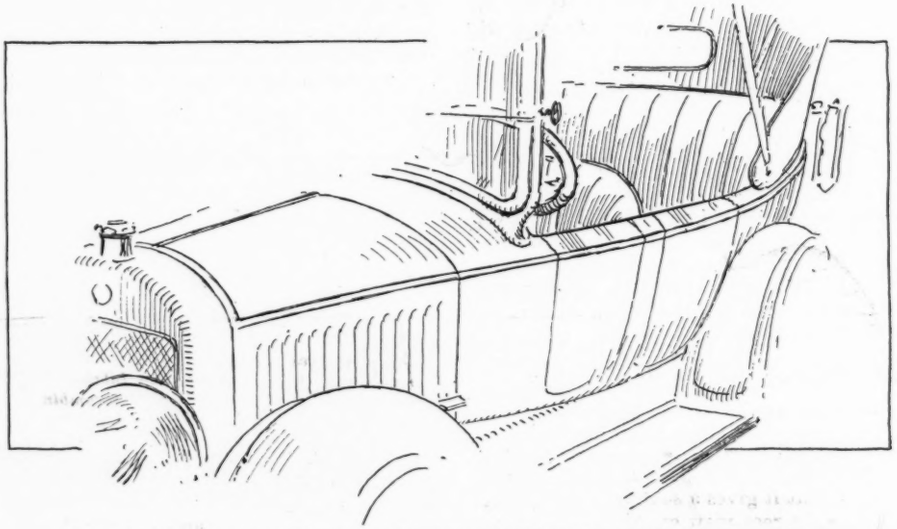
One of the best examples is the new Owen-Magnetic with the angle 6 or 7 in. below the top line of the side panels and at a point at which the general lines of the hood and car as a whole make the straight-line effect even more pronounced than usual.

The new Hudson, Marmon, Cole, Winton, Case, National, Stearns, Velie, McFarlan and Interstate and two of the special Silver jobs, one on the Kissel chassis and the other on the Apperson, are particularly worthy examples of this idea, in which the beveled edge is made a feature of the general straight-line effect of the body as a whole. Packard, one of the conservatives, carries out this idea in its later models.

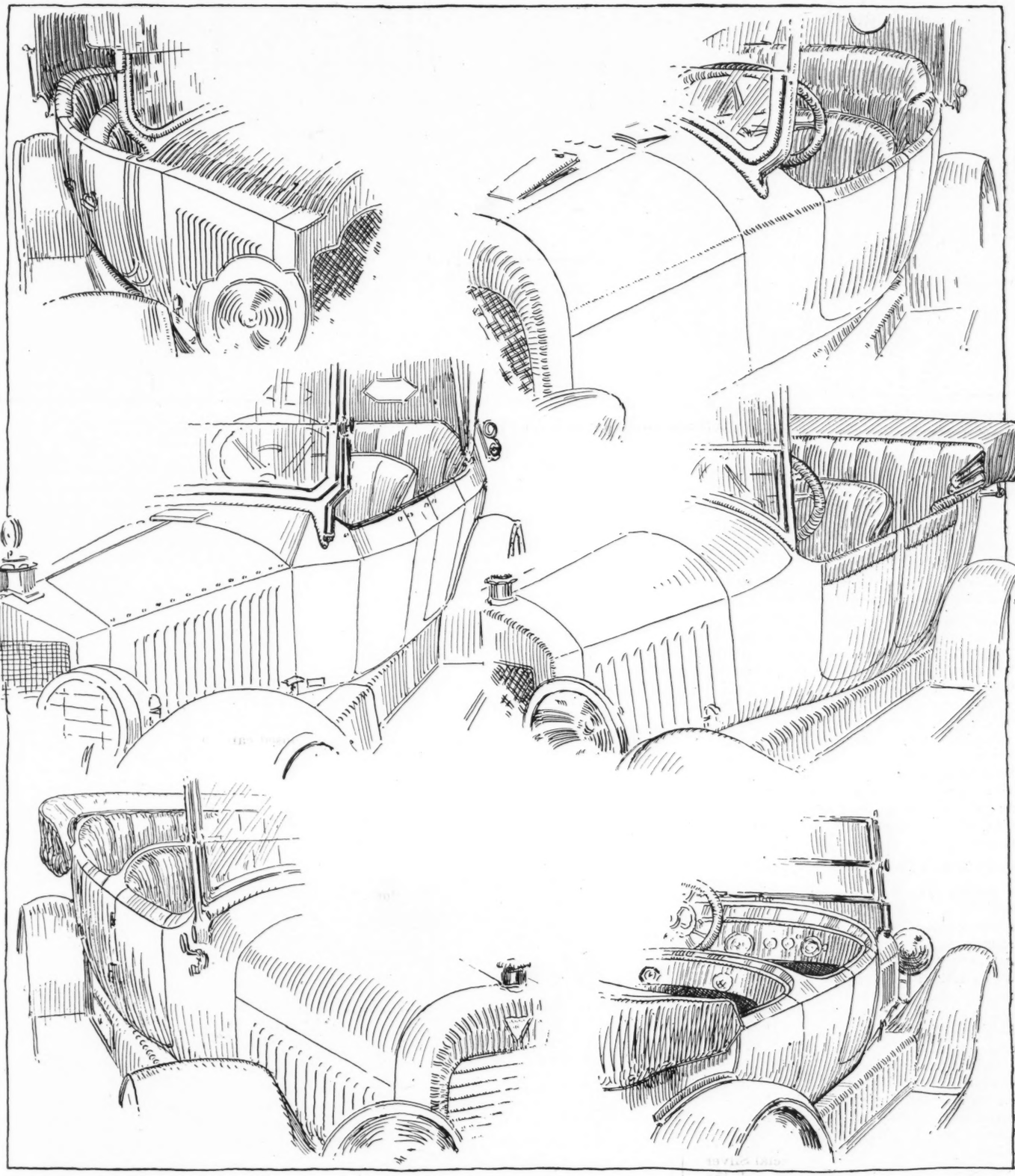
Along with the increase in height of the radiator there has come about another tendency which increases this effect of greater size of the forward end of the car. The new cars as a whole are lower in appearance; that is, the side panels are not so high as in recent years and the seats extend more above the top line of the sides. This tendency is a return to previous ideals of three or four years ago, and adds considerably to the comfort appearance of the open touring cars and at the same time adds somewhat to the glass area of the inclosed bodies. It gives the idea of greater body height, if the top side line is not carried through from front to rear, or is not interrupted too much by the center cowl.

There is one instance in which the beveled edge has been carried out in a closed car. It is the Owen-Magnetic sedan and is the only example in which an attempt to combine the turned-in panel with the closed body has been made. An Owen-Magnetic touring car is particularly noticeable for extremely sharp bevel to the upper edge of the panel.

Inclosed cars in general do not show any great development of line as compared with recent years. There is some improvement in fittings and finishing. Little things such as anti-rattlers for the glass work are more in evidence—certainly a step in the right direction, chiefly in the class of cars in which all the glass work disappears, as a tendency to rattle has been one of the disadvantages of this type of construction. New lines in inclosed bodies are in evi-



The straight line with the bevel-edge panel is enhanced by a broad stripe of contrasting color in this Winton

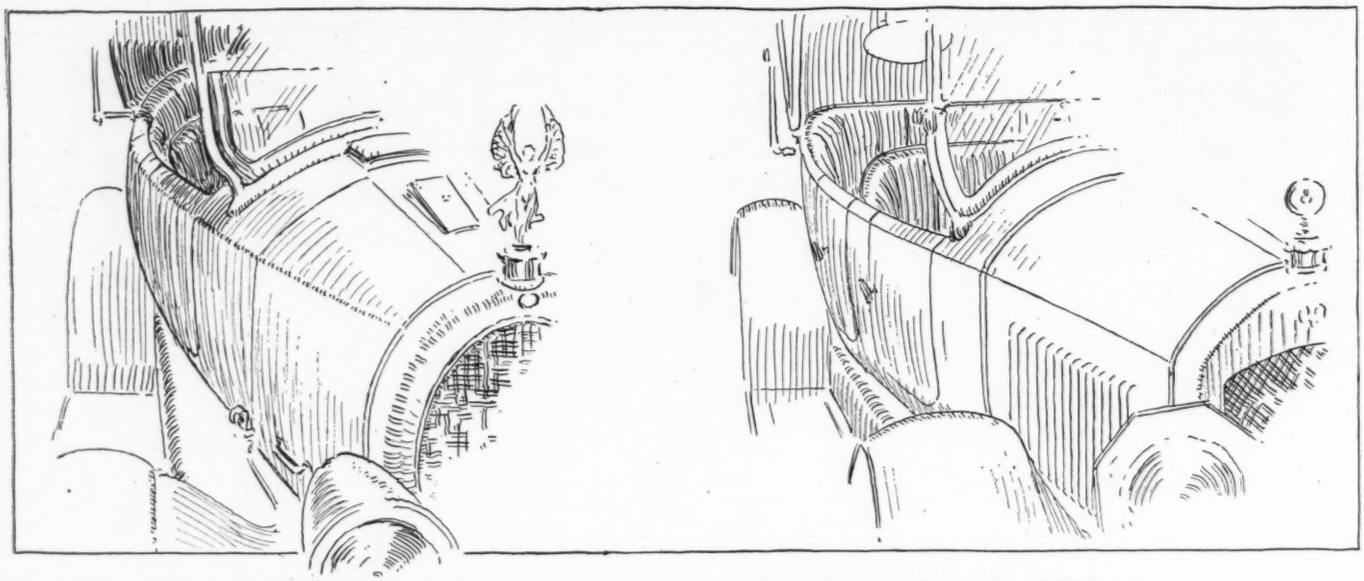


Upper left—One of the more recent Packards, which emphasizes the straight line. Upper right—KisselKar-Silver special with rounded hood. Center—Owen-Magnetic, left, one of the best examples of straight-line design, and Liberty. Below—Jordan sport-marine, right, combination of beveled edge and double cowl well carried out; left, Hudson with combined bevel edge and double cowl

dence on a Hupmobile sedan in which the vertical edges at the rear have a decided bevel so that it gives a somewhat octagonal effect to the rear view of the car.

There is much more in evidence among the new cars, of the type generally known as the sport models. These are in the form of four-passenger roadsters or close-coupled touring cars whose field is that of speed and smartness rather than carrying capacity. The very narrowness and shortness of bodies permitted for this purpose allows exceptionally speedy and smart lines to be provided and also permits a wide variation in detail as to how the effect is obtained.

Among the most advanced of this type the Velie sportster stands out. It is a four-passenger roadster which in the show model is a brilliant red with the exhaust exposed, separate pipes emerging through



The new body style is well carried out from front to rear in the Apperson-Silver, left, and Cole's new bodies, one of which appears at the right, are among the latest examples of the new body style

the hood and uniting to a large header below the frame. The exhaust manifold as well as all the other metal work is nickeled and an impression of power is added by the association of the exposed exhaust with the racing car idea.

One of the features which characterizes the four-passenger roadster this season is the boat-like effect of the body in which the open portion is designed to give an impression of a cockpit of a speed boat and the rear deck curves down to a pointed or else to a torpedo type of stern reminiscent of marine practice. This has been carried out in the Jordan sport-marine model.

National has a slate-colored four-passenger which both from its hue and from its lines reminds one of some speedy war craft. McFarlan has an unusual sport body with an extremely high hood and low sides and disk wheels designed to seat four or five persons.

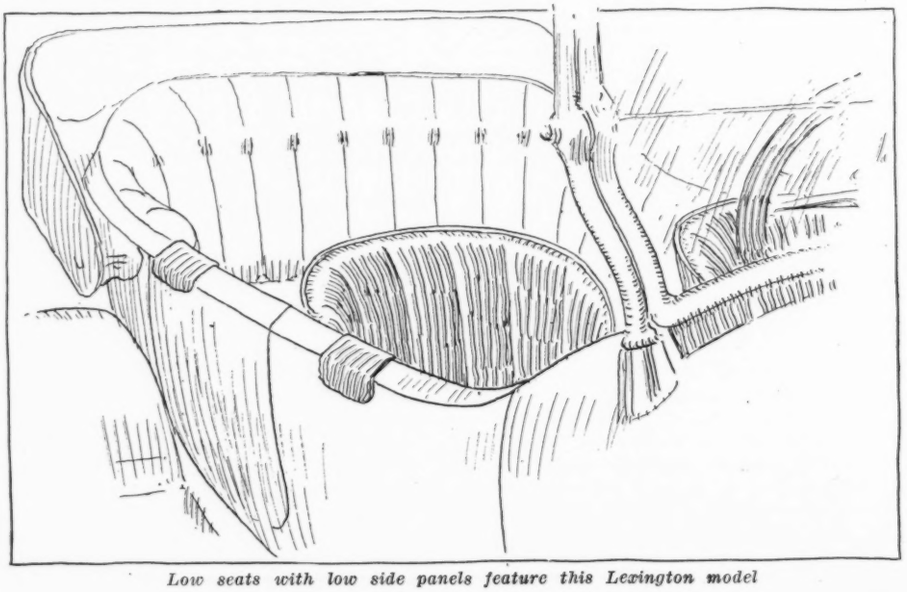
Sport Bodies Shown

Among the special body makers who are exhibiting separately from car exhibits, sport bodies are in evidence. Charles Schutte is showing a snappy two-passenger racy type body on a Saxon chassis. While designed to carry two normally, each fender carries a spare seat so that as many as six may be accommodated if necessary. This exhibit also includes a special tiny coupe on a Saxon chassis.

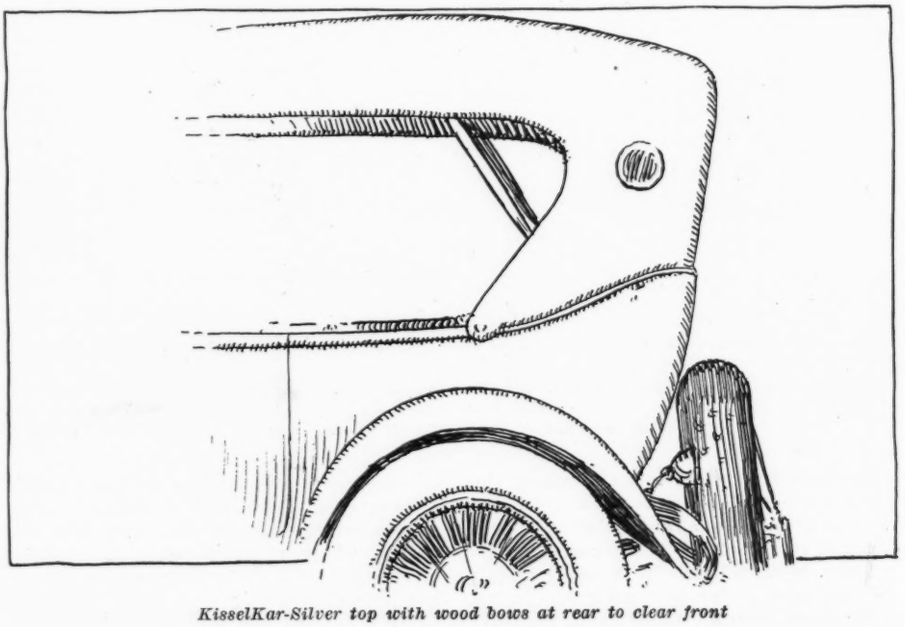
Military aspect is given to the cars this year in greater degree than before by the increased use of disk wheels. This is a movement which had its conception in Europe and is just now beginning to be taken up to a perceptible extent in this country. Among the cars on which the disk wheel is featured are Oldsmobile, Paige, McFarlan and Anderson.

Nash has a sporty four-passenger in which the color effects of maroon with white running gear and white wire wheels carry out the speed idea exceptionally well.

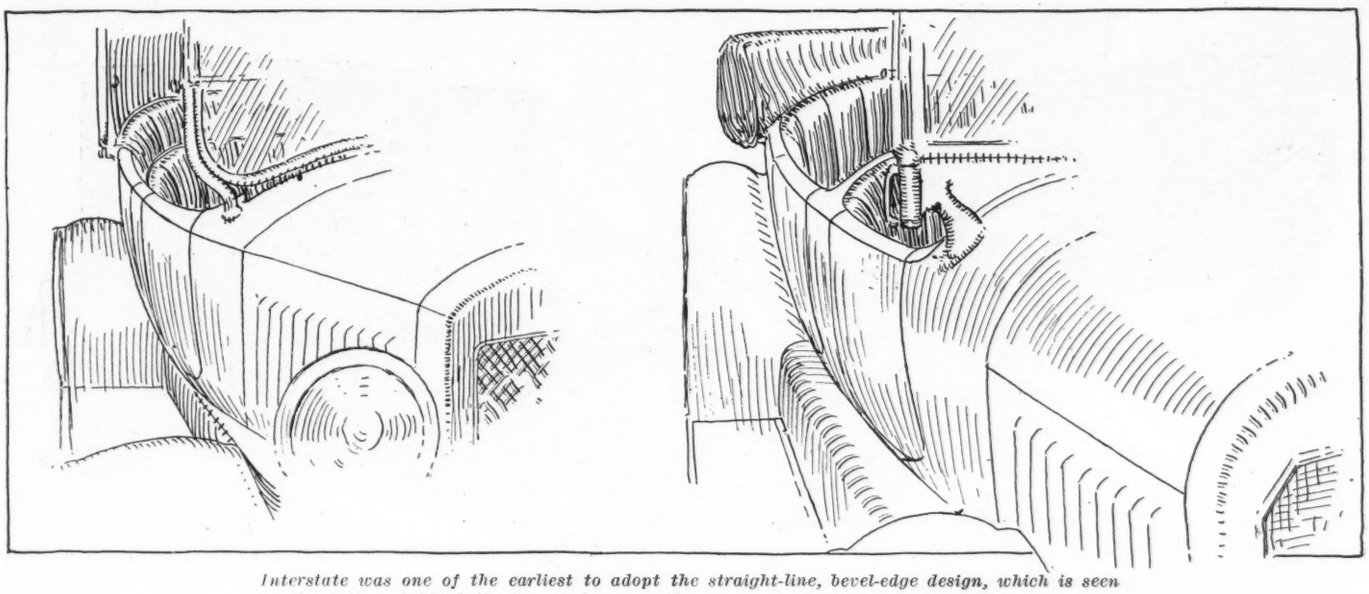
It is not always possible to give a correct idea of stock body coloring by a survey of the cars exhibited at a national show. Naturally enough, exhibitors attempt to put the smartest looking cars on display



Low seats with low side panels feature this Lexington model



KisselKar-Silver top with wood bows at rear to clear front



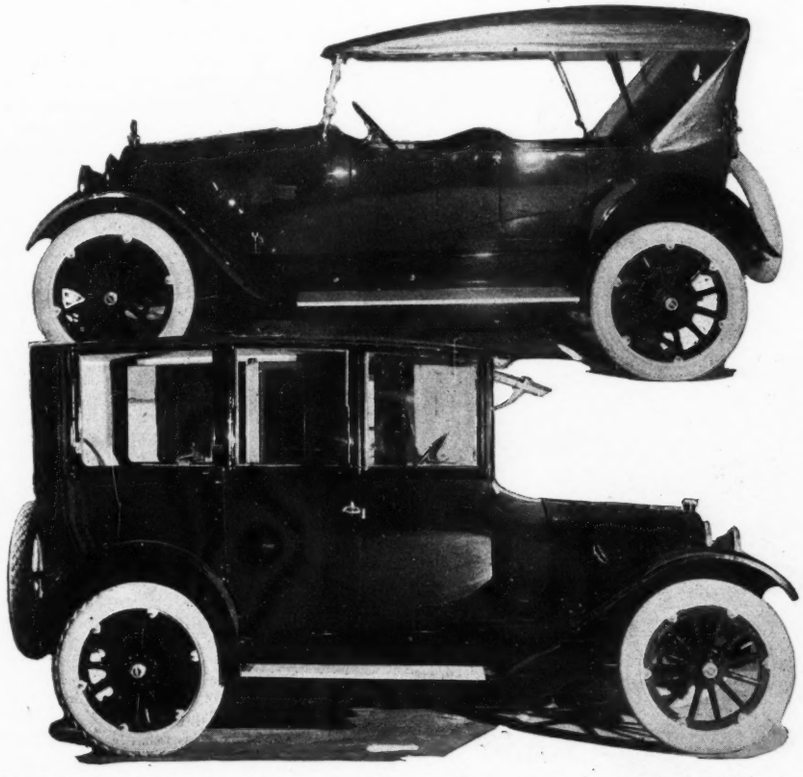
Interstate was one of the earliest to adopt the straight-line, bevel-edge design, which is seen at the left, and Mitchell also carries out this body idea, as shown by the body at the right

and quite frequently special color creations are considerably more attractive than the same body could be in the shades which come through as stock. Nevertheless, it is possible to gage pretty well the tendency of stock colors by comparing the show jobs from year to year.

In the coloring the straight-line idea has been made more pronounced and the beveled edges have been set off by lines which emphasize this feature. Therefore, striping is more in evidence. The stripes are broader and the general effect somewhat less subdued than formerly.

Aside from the striping there are less striking colors. The solid colors which form the body of the painting scheme are much less obtrusive than a year ago. Dark maroons, dark olives, dark grays and greens are the rule. There are even one or two lavender bodies which, strange to say, are of such shade that they do not strike the eye forcibly. General war tendencies toward greater quietness in every way probably are accountable to some extent for these more subdued color effects and also the fact that the less brilliant colors stand the weather considerably better than do bright ones has considerable to do with it.

Body design among the electrics evidences a decided trend this year toward reproduction of the lines of the gasoline cars. In several of these there is a gasoline car type of hood under which most of the battery is carried. The new Milburn electrics have two cars which are patterned quite closely after some of the higher-priced American gasoline car lines. The straight-line effect with a sharp angle at the hood and the line of this angle carried through to the rear is quite prominent.



Chevrolet eight-cylinder touring car, above, and Chevrolet convertible sedan, below

DEALERS POOL NIGHT SERVICES

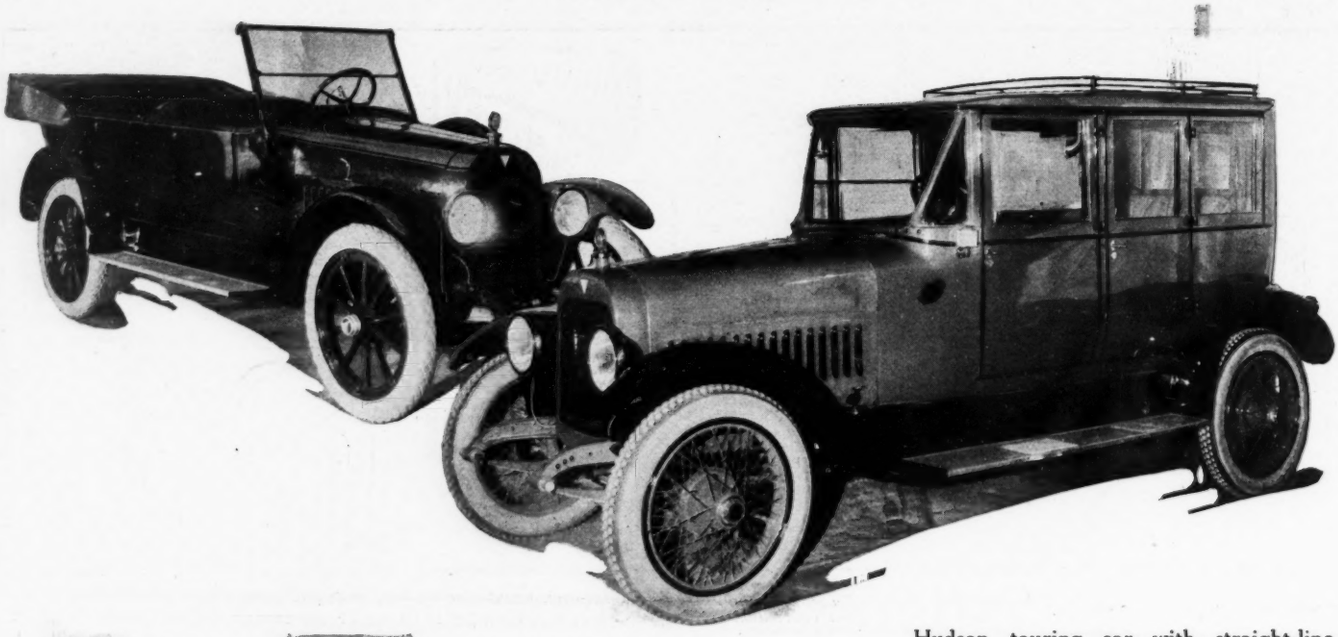
Grand Rapids, Mich., Jan. 4—Eighteen of the leading dealers in this city have cut out night and Sunday service as a means of reducing overhead. In order that service may still be rendered at night they have designated one garage, the Bronson, in the downtown section as an emergency service station for all dealers and have notified 5000 car owners in this section of the new plan. Any short-time repair will be made nights and Sundays by this garage, which will take care of all emergency work. Jobs which cannot be done in a short time are turned over to the proper dealer at the beginning of the next working day. The owner of the car is asked to notify whichever dealer he wishes to handle the job.

NEW PRICES FOR DORT

New York, Jan. 5—New prices for the Dort were announced today. The five-passenger touring car and the roadster, which were $725, are now $865. In the four-season line the sedan, which was $1,095, has been made $1,265; the sedanet, a convertible type, has been raised from $845 to $1,000. The new coupe model not heretofore manufactured will sell at $1,265.

NEW DELIVERY CAR

New York, Jan. 7—A new small delivery car is making its bow to the business world at this time. It is a small three-wheeled type made by the New York Rotary Motor Co., of which the president is Arthur S. Alexander, of the J. Alexander Mfg. Co., an old firm in the trade; Harry S. Houpt, Hudson dealer in New York is another officer; Colonel Theodore Marceau, a Fifth avenue photographer, is interested and the fourth member of the company is John L. Miller, Jr. Because of its small



Hudson touring car with straight-line, bevel-edge body, left, and Hudson touring sedan with baggage rails at top

price, which is $295, its economical operation and its ability to carry a load of 500 lb., its promoters believe it will have a very large sale. It is said one order for about 18,000 is already in hand and that production will be under way by April 1.

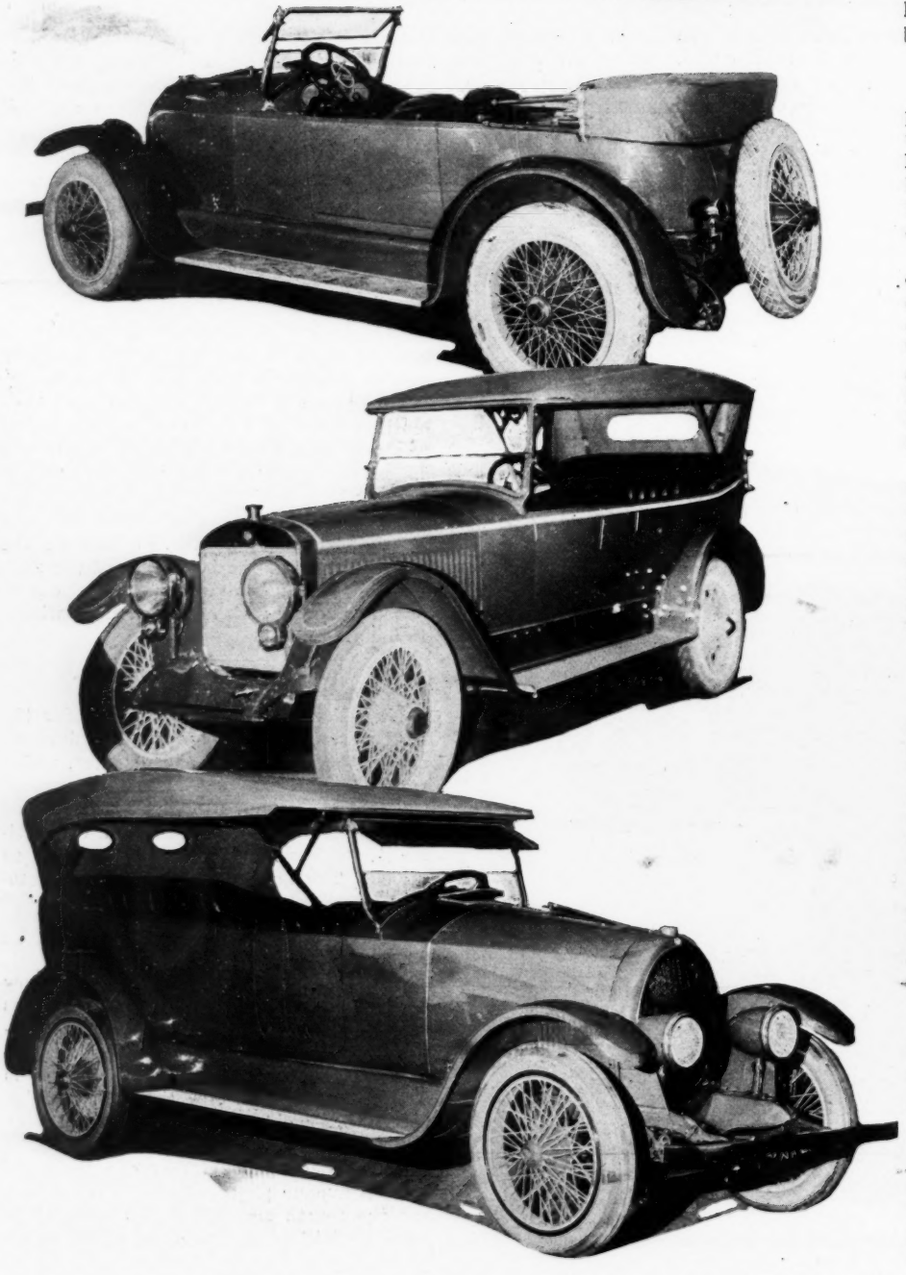
The engine is a rotary type with three cylinders inclosed within the spokes of the driving wheel, which is placed at the middle and rear of the three-wheeled chassis. The body is mounted forward on the axle and the driver sits above the engine behind the body, a form of construction that has been seen before in small package delivery cars.

The engine weighs 34 lb. and will develop 10 hp., it is stated, and will make 10 miles to the gallon. A medium speed of 25 m.p.h. is obtainable and the car is said to run for 1½ cents a mile. Tires which are pneumatic and 30 by 3, are said to give 7000 miles. The whole vehicle weighs 300 lb. Cylinders are 2⅞ by 2½.

NEW AIR COOLER MAKES DEBUT

New York, Jan. 7—The new Holmes air-cooled car about which there has been much speculation quietly appeared at New York to-day in a private display. As the design of Arthur Holmes, for seven years chief engineer of the Franklin company, the new car was expected to show many of the principles which made the older one so successful. While the characteristic air induction around six individually cast overhead-valve cylinders is a feature of the Holmes as in the older car, there are many changes of detail mechanically.

Externally there is no resemblance and the wood frame which is a feature of Franklin construction is replaced by the conventional steel channel, though elliptic springs form the suspension. It is the

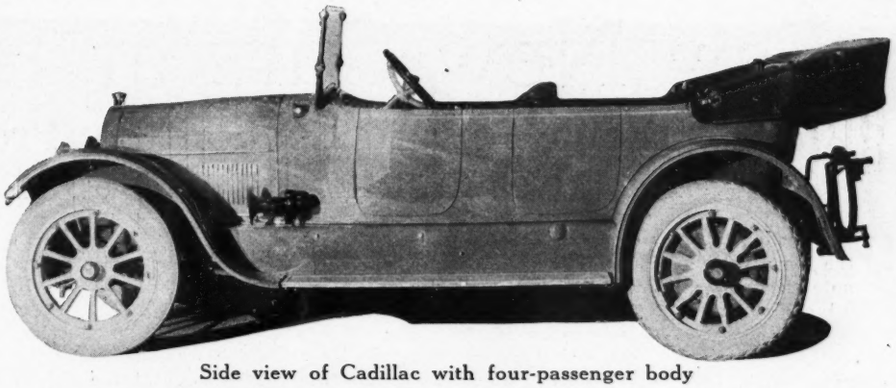


Three-quarters left rear view of Kissel-Kar-Silver special, above, Winton big six with straight-line design, center, and Apperson chassis with special Silver body

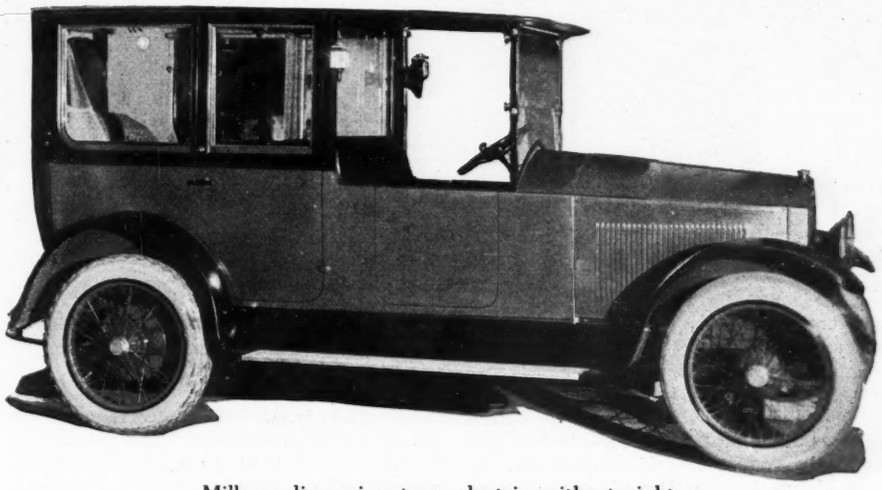
product of the Holmes Automobile Co., Canton, Ohio, and a production of 4000 is scheduled for the year, the first twenty cars coming through this month. The price is between $2,000 and $2,500.

Seven-passenger touring car and a sedan are on the immediate program with a roadster later. As may be expected the body designs are very distinctive. The hood is somewhat near the conventional form with a rather high but slanting front and, of course, air openings in front but hinges at the dash.

The body work is exceptionally attractive. The engine is a six 3½ by 4½. Valves are in the removable dome-shaped cylinder head and are inclined at an angle. An original type of rocker mechanism operates the valves, the design being such as to compensate for lengthening of the push rods so that the tinning will not be changed by expansion. A Newcomb carbureter, vacuum feed, Eisemann magneto with automatic advance and Dyneto single-unit electric system are among the features.



Side view of Cadillac with four-passenger body



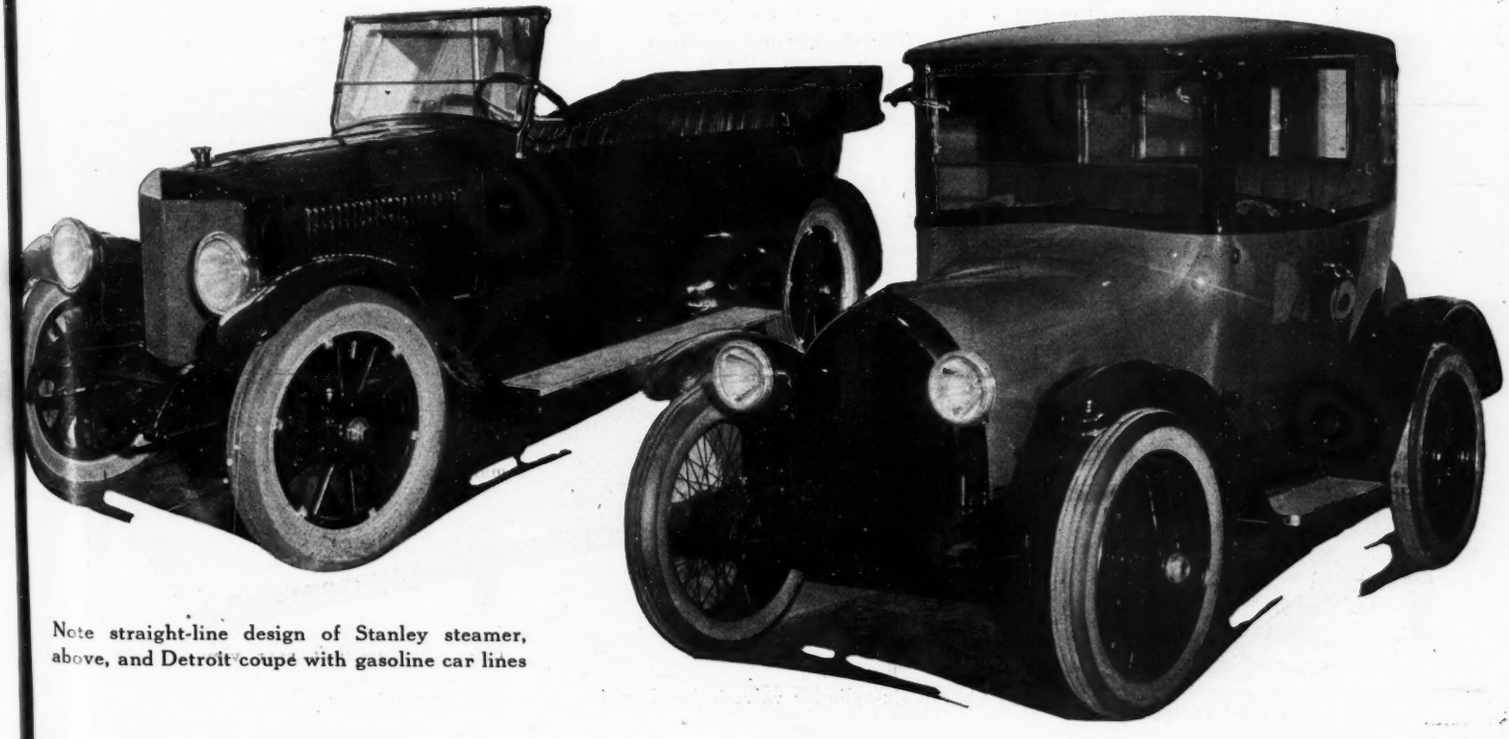
Milburn limousine type electric with straight-line body and most of battery under hood

BARNES' FOUNDRY TO DISSOLVE

Detroit, Jan. 5—The Barnes Foundry & Mfg. Co., Detroit, a $2,000,000 corporation organized last July to manufacture cylinders, pistons and other gray iron castings, has decided not to go ahead with its building and by a unanimous vote of its directors has determined to sell its real estate which has increased largely in value.

War conditions and the uncertainty of business prospects in this particular line were responsible for the decision to dissolve the company at a time when plans were well under way for an extensive factory. This announcement is quite unusual from the fact that it seems certain that all the stockholders will receive all the money they have paid in, with interest. In fact, the checks for the last installment of the stock have been returned to the stockholders by the board of directors. It is anticipated that when the 34 acres of property owned by the company are disposed of, sufficient will be realized to repay to the stockholders all the money that has been invested with interest and probably profit.

The company whose property is located next to the Great Lakes shipbuilding plant, one of the few available factory sites on the Detroit river, has among its directors some of the most prominent men in the industry. It was organized last July by Claire L. Barnes, who has spent about fifteen months perfecting its plans. Mr. Barnes has not made any plans for the future but expects to have all of the company's affairs cleaned up very shortly.



Note straight-line design of Stanley steamer, above, and Detroit coupé with gasoline car lines

Few New Cars at Exhibition

Trend Toward Economy in Production— New Overland Four Is Displayed

BY analyzing the new cars exhibited at the New York show one cannot help but note the manner in which the valve-in-head engine is strengthening its position in the industry. This is exemplified by the fact that out of six entirely new cars exhibited, four are powered with overhead-valve engines and the remaining two use the L-head design.

Perhaps the most interesting of the new cars is the Overland four, a low-priced creation by Willys-Overland, Inc. Although the price has not yet been definitely announced it is expected that it will be such as to place it in direct competition with the Ford. This new car is designed for quantity production to reduce the list price to a minimum.

Design for Economy

The number of surprises this year, however, are not nearly as numerous as they have been in former years, but there is a marked trend in engineering practice to design cars for economy in production and thus, in spite of the increases in the cost of labor and material, keep the car within its class in regard to price. Among the new designs are the Scripps-Booth six, the Owen-Magnetic, the Olympian, the Crow-Elkhart and the Moore, each of these having for the first time the highly developed type of overhead-valve engine. Both the Overland four and the Moore are equipped with the L-head type of engine.

In addition to these several concerns are exhibiting new bodies at the New York show for the first time. The 1918 Hupmobile, which is a comparatively new car, is exhibiting a complete line of inclosed bodies. Oldsmobile is showing its new sportster. Cole is exhibiting its bevel-edge bodies for the first time. There is a new Liberty limousine, a new Elgin sport model and convertible sedan. McFarlan has a sportster of rather extreme lines. There are also many special show bodies which are not regular products but are merely for exhibition purposes.

The Willys-Overland big production, low-priced four, which was shown for the first time three months ago at the Toledo factory in chassis form to a few inside observers, is submitted to the eye of the public for the first time. The complete car is not on exhibition but the chassis and an unfinished body suffice to give not only a clear idea of the construction of the new product but also of its complete appearance. Its predominating feature, from a construction standpoint is the skillful use of pressed steel in both chassis and body. Wherever possible there is a pressed part, giving the desired lightness and low cost. Another feature of the car is the extension of the chassis suspension forward of the front axle and behind the rear axle by an overhanging form of spring arrangement.

The result is that Willys-Overland, Inc., has produced a 1500-lb. car on a wheelbase of 100 in. with the equivalent of 130 in. in spring suspension. The frame side members are long pressed steel parts, spaced quite closely together, the distance from the inside of the channel side on one side to the inside of the opposite channel being 23 in. These side members are rounded off front and rear so that the form of the chassis frame is what might be roughly called a flat-sided, narrow, continuous elipse, the elipse itself being 130 in. from end to end.

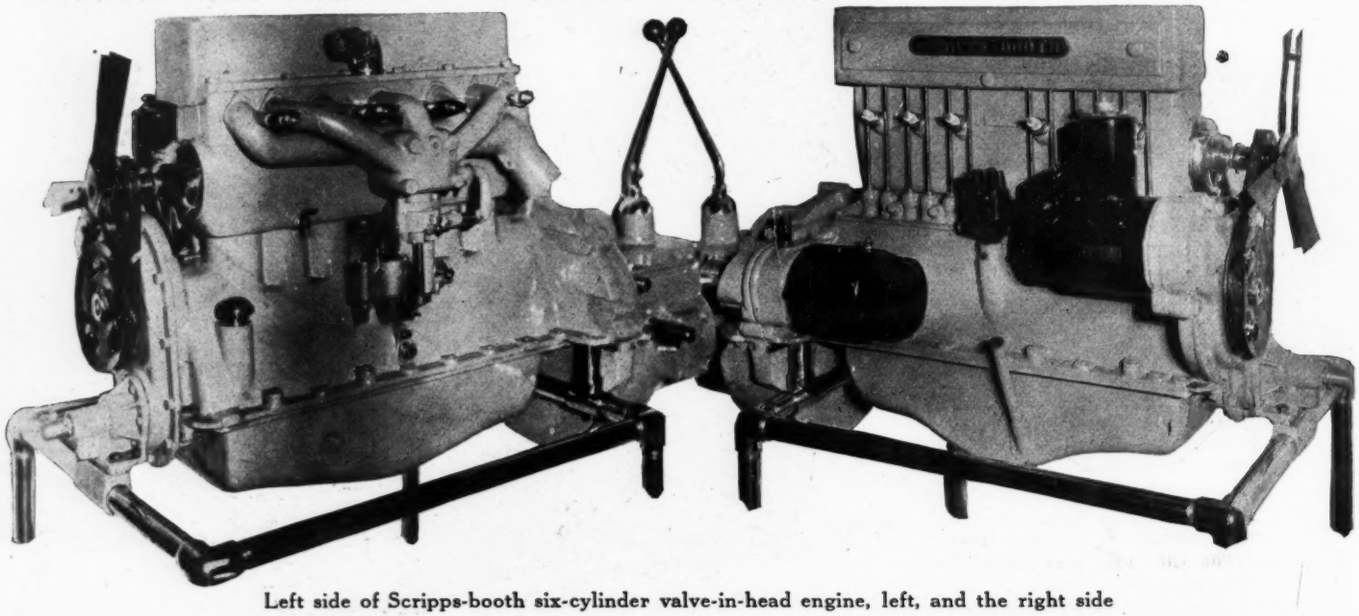
As the wheelbase is 100 in. long the front and rear axles are both 15 in. from the ends of the frame, this amount being represented by the overhang of the chassis. The springs are mounted in such a way as to connect the overhanging ends of the frame to the axle, this being accomplished by horizontal V-type suspension at both front and rear. The front springs are fixed at both the frame and axle and the rear springs are shackled on one side and pivoted on the other to take care of the movement of the body, thus the front axle member is relied upon to absorb directly the spring stresses by slight movements of the front axle from the vertical.

Conventional Engine

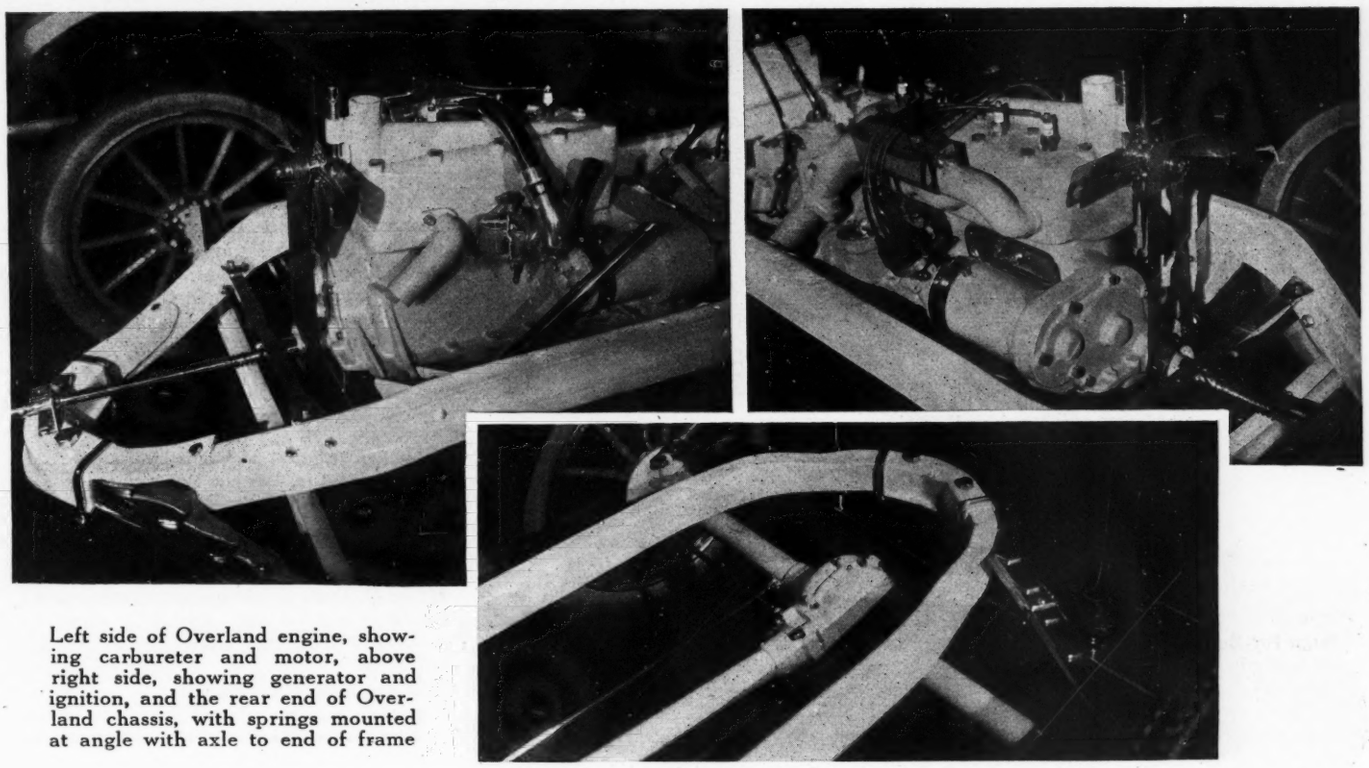
Outside of the radical departure from usual practice in the arrangment of the frame members and suspension, the Overland four does not depart from standard design in its other features. A conventional type of block L-head four-cylinder engine is used with dimensions of 3¼ by 4 in. The valves are operated from a gear-driven camshaft through mushroom push rods. Cooling is by thermo-syphon and oiling by a pressure-feed system in which the oil is thrown by centrifugal force by the flywheel through an oil strainer and then to a lead to the hollow crankshaft. The hollow shaft also takes care of the lower connecting rod bearings.

The castings for the engine are arranged in accordance with up-to-date practice in L-head design. The cylinder head is removable and the cylinders are cast in unit with the upper half of the crankcase. This casting also carries the engine-supporting feet at all four corners, giving a four-point rigid suspension. The water-jackets are large, and with a cellular tube radiator with a large tank at the top, the cooling system holds 7 gal. of water, which is much more than that employed in cars of far larger size. In connection with this radiator is a fan driven by belt from a gear on the end of the crankshaft, and the tension on this belt is maintained constantly by a spring.

A complete electrical system is em-



Left side of Scripps-booth six-cylinder valve-in-head engine, left, and the right side



Left side of Overland engine, showing carbureter and motor, above right side, showing generator and ignition, and the rear end of Overland chassis, with springs mounted at angle with axle to end of frame

ployed. The units are the Auto-Lite for starting and lighting, and the battery equipment may be either U. S. L., Gould or Willard. The battery capacity is 50 amp-hr. The motor and generator are mounted separately, the generator being on the right side and driven directly from the timing set, while the starting motor is on the left side and is engaged with the flywheel by Bendix gear.

The clutch and gearbox are mounted with the engine as a unit powerplant. The clutch is an oil disk type, having three disks faced with Raybestos. It is housed within the flywheel and gets its oil from the supply which goes to the engine, in fact, the same oil lubricates the entire unit plant, flowing back also to the gearbox which is a three-speed, sliding, selective type. From the gearbox the drive passes through one universal joint to the propeller shaft and thence to the three-quarter floating rear axle. This axle is in reality a single bearing floating type with a ball bearing pressed over the outside of the axle housing, carrying the wheel, and a roller bearing at the differential end. The wheels are wood, carrying 30 by 3½ tires, non-skid in rear.

Two sets of brakes are used, the foot brake being mounted on the jackshaft of the gearbox, giving what is commonly known as a transmission brake with the hand brake on at the rear wheels. The control members for operating the brakes and controlling the other functions of the car are placed in the customary manner.

The body is a production job also, being pressed steel throughout. The type shown at the exhibition is a five-passenger job arranged with an apron-like projection in the front and a rounded off rear to accommodate itself to the overhanging frame suspension. The running boards are supported from the chassis by two pressed steel U bars inverted to rivet to the frames giving a substantial support to these boards. The color of the body is not fixed and there are some other details which are also to be settled upon before the car is put into production. For instance, the gear ratio on the model shown is 4.73 to 1. This may be altered and the color is not decided on. It is expected that a definite move toward production will be made during the coming spring.

For the first time the Scripps-Booth car appears in six-cylinder, five-passenger form. The familiar body lines which have created a name for distinctiveness remain, although they are modified to accommodate them to the new touring model. The new Scripps design is due without doubt to the definite inauguration of this concern as a part of the General Motors Co. and General Motors units displace the parts which formerly were purchased elsewhere. This is particularly true of the engine, which is now the Northway overhead-valve six.

New Scripps-Booth

The new car, which is sold as a five-passenger for $1,195, is mounted on a wheelbase of 112 in. and equipped with a 2 1/8 by 4¾-in. unit power-plant, having its six-cylinders cast in block with the valves operated from a single camshaft which actuates a set of exterior side rods and then the over-head rocker arm valve set. The cylinder heads are detachable and are held in place by long studs, and there is, in addition, a coverplate which incloses the valve action to give dust-proof qualities and silence.

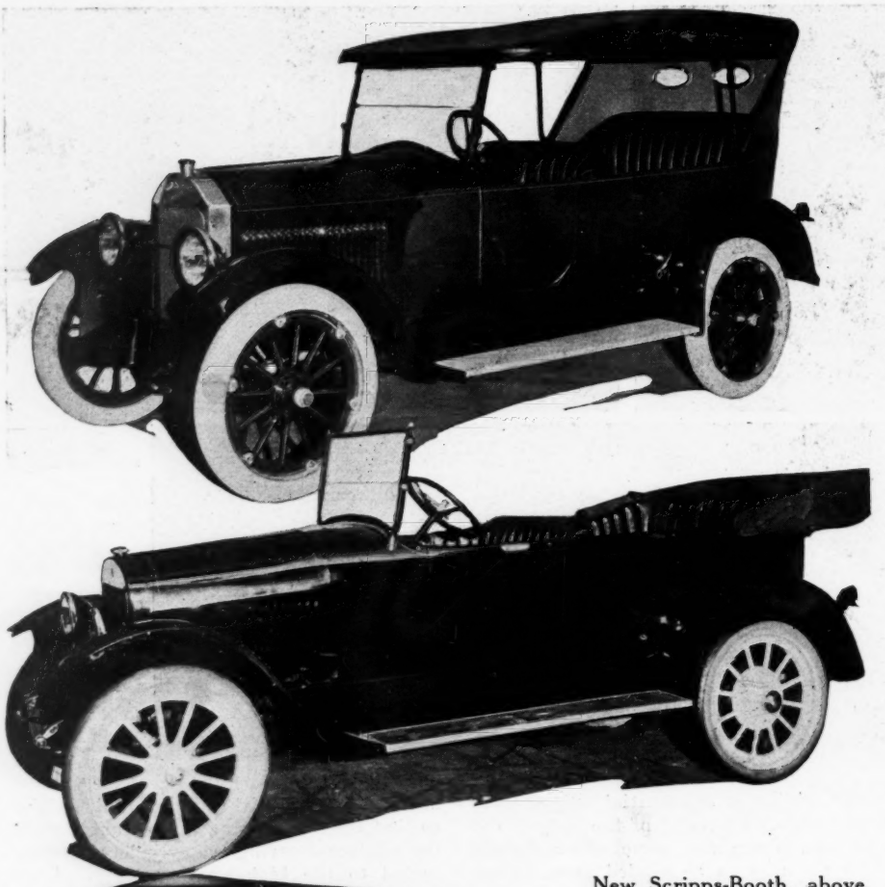
The intake manifold on the new engine employs the hot plate principle to aid in evaporation of the mixture. The manifolds are on the right side of the engine and the exhaust from the two central cylinders is directly against the portion of the manifold around which the intake gases are led. The carbureter is a Marvel and is provided with a full hot-air intake so that the air entering the carbureter and the mixture entering the cylinders are subjected to the high exhaust temperatures before they are brought into the combustion chamber.

Pump cooling is used, the water pump being driven off the fan belt. Both the fan and pump are on the same shaft. The belt is a notched type to give positive drive. The fan is what is known as the biplane type, being a three-blade unit with each blade having two parts parallel to each other in the form of a biplane. Starting, lighting and ignition is by the Remy system and the fuel feed is by a Stewart vacuum tank with a rear gasoline tank.

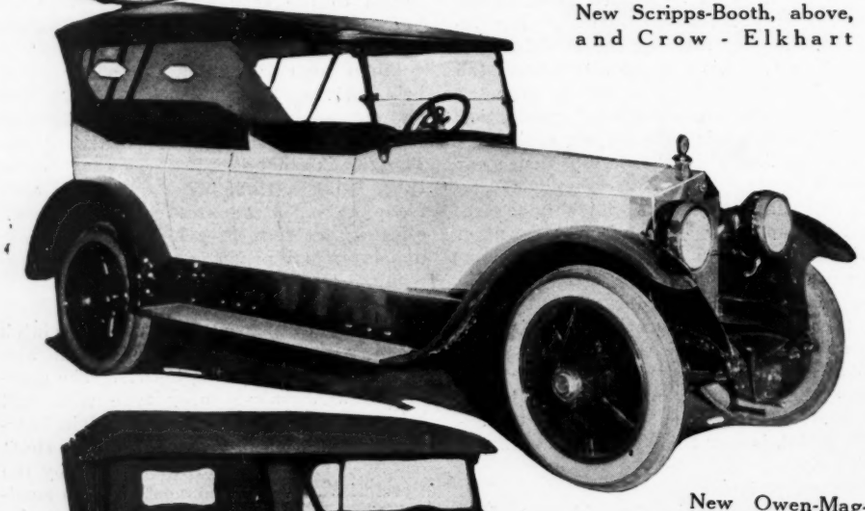
Power is transmitted through a clutch faced with leather and having an aluminum cone with spring inserts. The gearbox is a Warner-Munsey type with ball bearings on the main shaft and plain bearings on the lay shaft. The propeller shaft has two universals, and the drive is by the Hotchkiss system in connection with semi-elliptic springs. In addition to the equipment mentioned the list price includes Marshall upholstery springs and a Stewart speedometer.

The Olympian Motor Car Co., Pontiac, Mich., is exhibiting the first of its new cars at the New York show. This is a new design throughout and incorporates the features which have been associated with the Brush engineers such as the valve-in-head engine, deep frame construction in which the side members are formed by the splash apron and the running boards are also part of the frame structure, the full circle housing on the rear axle and the related features which go with this type of construction.

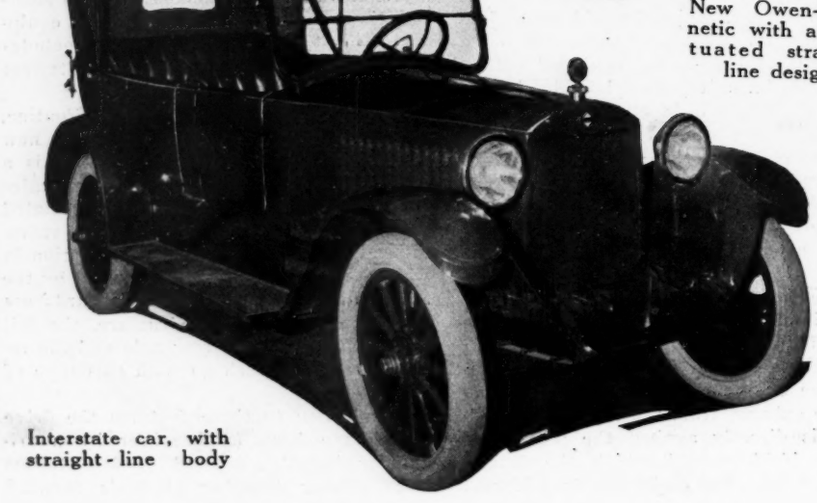
In addition to these features the drive units have been made stiffer by a triangular layout composed of two torque arms coming together at their forward



New Scripps-Booth, above, and Crow - Elkhart



New Owen-Magnetic with accentuated straight-line design



Interstate car, with straight - line body

ends so that an equilateral triangle is formed by the two torque members and rear axle. Mounted on a wheelbase of 112 in. the body is typical of up-to-date expression in economy of space. The cowl is so arranged that it takes up but little room and the gearshift lever is brought out from beneath the cowl with a bend which carries it directly to the hand of the operator. In place of the ordinary type of hand brake a handle operates on a pull rod through the dash so that the manipulation of the hand brake is rendered exceptionally easy and accessible. A clear aisle is left across the width of the front seat by this arrangement of levers so that in spite of the reasonable length of wheelbase there is more than a normal amount of room both front and rear.

The powerplant is comprised of a four-cylinder engine, Borg & Beck clutch and a three-speed ball bearing gearset mounted as a unit. The engine is a 3¼ by 4½ in. block four with detachable head carrying the Brush overhead valve gear which is so designed that adjustments on the valve clearance can be made while the engine is running. Aluminum alloy pistons, Lynite, are used.

Counterbalanced Crankshaft

A counterbalanced crankshaft is fitted with counterweights which are brought as closely as possible to the plane of rotation. The crankshaft has two main bearings and the diameter of the shaft at the front bearing is 1¾ in., while at the rear bearing the diameter is 2¼ in.

The engine has been designed from an upkeep standpoint, particularly the removable valve-in-head action rendering the combustion chamber and valve system readily accessible. The main and camshaft bearings can be reached by dropping the cam at the bottom, and it is possible to effect all necessary adjustments by these two methods without removing the engine from the chassis or tearing it down completely.

Lubrication is by pressure circulation with a gear pump, the oil being forced through the crankshaft to all the bearings. Carburetion is by a Stromberg instrument, and ignition, lighting and starting is provided by separate Remy electric units. Cooling is by thermo-syphon and a 4-gal. tubular radiator aided by a fan which is belt driven from the front end of the crankshaft. The flywheel carries an 8-in. diameter Borg & Beck dry-plate clutch. From this unit the drive is transmitted through a three-speed gearset unit mounted on S.K.F. ball bearings on the main shaft and plain bearings on the countershaft. The gear ratios are provided of 3 to 1 on low, 1.89 to 1 on intermediate and 1 to 1 on high; the reverse ratio in the box is 3.62 to 1. The final reduction at the rear axle is 4¾ to 1. The propeller shaft has two universals and is relieved of torsional stresses by two presesd steel torque arms previously described. The rear axle is a three-quarter floating mounted on Hyatt bearings.

The chassis frame is of alloy steel, having a depth of 6 in. and a horizontal width at the top flange of 2 in. Springs are semi-elliptic front and transverse type rear. The length of the rear spring is 40¼ in. and of the front 32½ in., the rear having eight leaves and the front having six. The

length of the upper rear spring is 40¼ in. and of the lower rear spring 44¼ in. The width of the rear springs are 2 in. and there are eight leaves in the upper half and nine in the lower. The front spring has a length of 32½ in. and width of 1¾ in. and employs six leaves. The wheels are wood artillery type with 32 by 3½ in. tires.

The body is a five-passenger double-cowl streamline type with slanting windshield. It is built in the Olympian shops and follows the somewhat angular line now in wide use. It is equipped with an electric light in the rear right hand door for lighting the tonneau and entrance. There is also a two-passenger design of individual lines. The equipment includes a Boyce Moto-Meter, Stewart-Warner speedometer, bumper and a complete set of tools. The price is $1,085.

New Owen-Magnetic

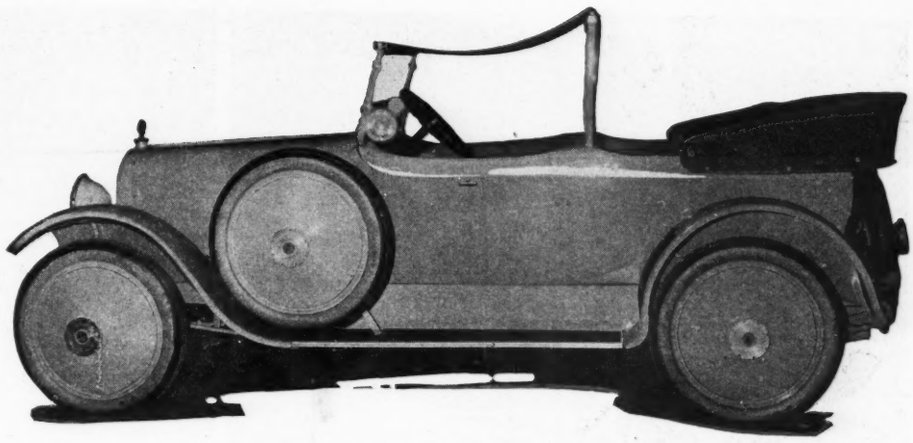
A new Owen Magnetic which has been considerably revised and refined as compared with the last model is on exhibition for the first time at the New York show. In body work it is probably one of the most distinctive types at the exhibition and carries out to a marked degree the tendency toward the beveled edge. The hood lines are beveled as are the side rails of the body and this beveled effect is carried around to the rear end so that it finishes off in the same angular style as characterizes the rest of the car. The price of the car with this new body is increased $1,000 over the former price, being now $5,475 as a touring car and $6,500 as a limousine. These prices are delivered in New York and include the war tax.

Mechanically the most important development is in the use of a new overhead-valve engine. There is also a better control, which more uniformly graduates the intermediate steps in speed control. The new control apparatus also permits of a better braking action by allowing the current of the motor, acting as a generator, to increase the field strength of the electrical driving unit, thereby giving an increased drag on the armature for more severe braking.

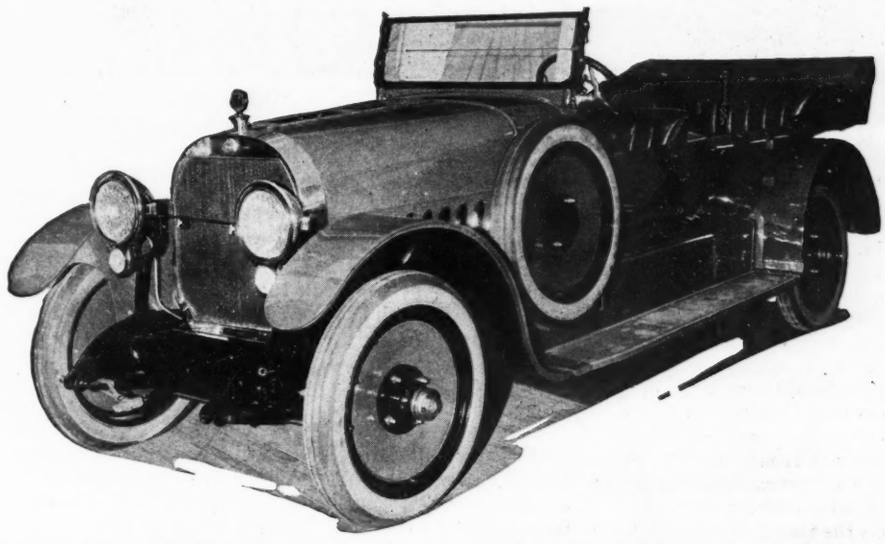
The new car is now 6 in. longer in wheelbase, being 142 in. This is made necessary by the rearranged body and larger engine. The new engine is a 4 by 5½ overhead-valve six with the cylinders cast in two blocks of three. The overhead-valve construction is carried on a single detachable head which fits both cylinder blocks. The engine is capable of delivering 80 hp. on the brake, according to the claims of the makers, and is manufactured specially for the Owen-Magnetic cars in the R. & L. plant.

Both the upper and lower halves of the crankcase are aluminum castings. The upper half of the crankcase is a ribbed structure stiffened to support the main bearing and to carry the crankshaft load. The latter not only must perform the usual duties but must also support the revolving member of the magnetic clutch, forming a part of the transmission which acts in place of the conventional flywheel. The pistons are ground and lapped into the cylinder and drive through drop-forged, oval-section connection rods.

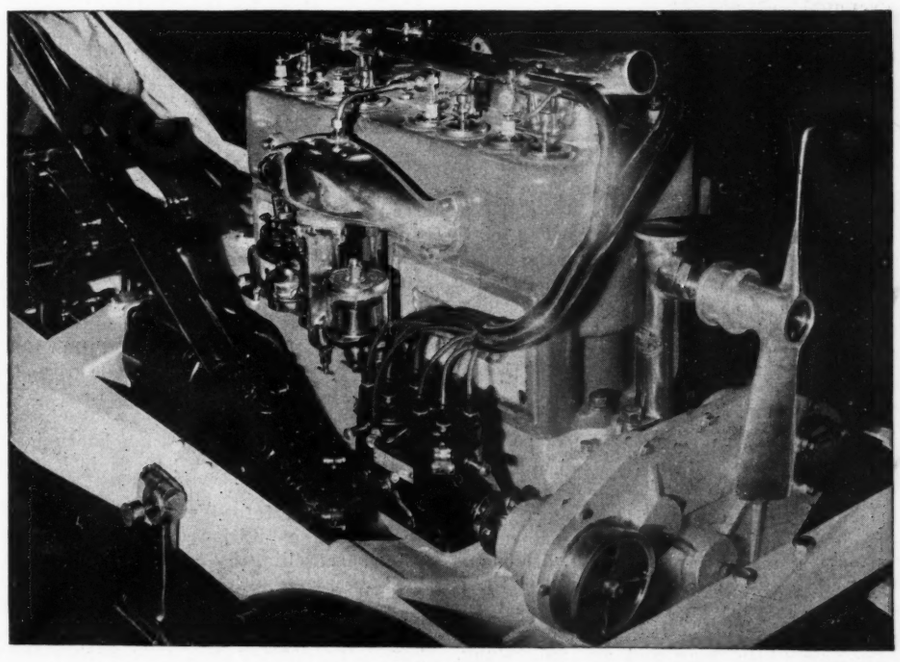
The camshaft and the water pump and magneto shaft are driven from the crank-



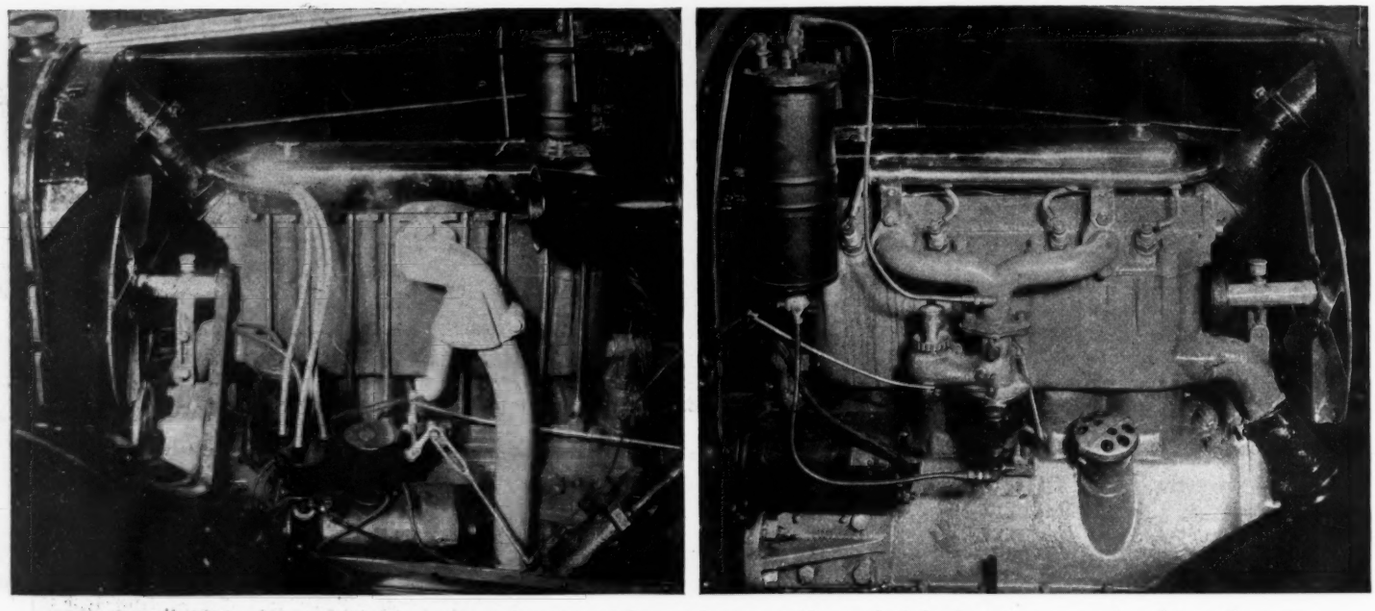
Anderson convertible runabout-touring car with disk wheels



McFarlan sport model, which is fitted with disk wheels



Stutz engine, showing two distributors for double ignition



New Crow-Elkhart four-cylinder engine, showing, right, carbureter side, and, left, hot-air connection for carbureter of engine, which is built by the company

shaft by a timing set composed of three helical gears inclosed by the aluminum cover. The valves are tungsten steel 1⅞ in. in diameter and are used with the overhead system carried in the detachable cylinder head. They are operated by drop forged rocker arms and push rods entirely inclosed by cover plates. The exhaust from the engine is led in the manifold to the forward end of the engine and the exhaust pipe curves down from that point below the body, keeping the heat away from the front compartment. The intake and exhaust manifolds are on the left side and the intake passages are arranged so that the single connection to the carbureter is cast integrally with the exhaust manifold and passes through it. This gives a highly preheated mixture and aids in the vaporization of the fuel.

Vacuum Fuel System

Gasoline is fed by the Stewart vacuum system and ignition is by a Bosch high-tension magneto. Lubrication is by pressure feed with the gear pump supplying the lubricant under a head of from 20 to 30 lb. at normal running. The pressure is proportional to the power requirement and the oil under pressure is taken directly to the camshaft rocker arm bearings and timing gears besides the bearings directly concerned with the operation of the crankshaft. Cooling is by centrifugal pump, the pump being on the same shaft as the magneto. A Sylphon thermostat is located at the upper tank of the radiator, checking the flow of the cooling liquid by a bypass until the proper running temperature has been reached.

There is no alteration in the electrical system other than in the control unit mentioned. The chassis frame has been strengthened to support the longer wheelbase and is now 8 in. deep, of pressed steel channel section provided with many stiffening cross members and gussets. Although the wheelbase is 142 in. the turning radius is but 24 ft. The rear springs are now 61 in. long and are underslung. The standard rim equipment is Firestone straight sides and the tires are 35 by 5 in. cord with ribbed front and non-skid rear.

Crow-Elkhart is showing for the first time its revised car employing the new valve-in-head engine which is being built by the Crow-Elkhart company itself. The engine is a rocker arm type, four-cylinder 3½ by 5 with a counterbalanced crankshaft having the counterweights electrically welded into place. The new car contains several changes in practice as compared with previous Crow-Elkharts. In the former L-head engine a two bearing crankshaft was used, whereas in the new type of engine there is an additional bearing.

Oiling is now by splash pressure, cooling by thermo-syphon, and in place of the three-quarter elliptic springs, semi-elliptics are employed with a frame extension to take the place of the quarter which has been removed. Another big change is the abandonment of the rear axle gearbox and the substitution of the unit powerplant. In place of the clutch formerly made by the Crow-Elkhart company the Borg & Beck dry-disk is being used. In place of a cowl gasoline tank, the tank has been moved to the rear and Stewart vacuum feed employed. Other detail changes have been put into effect, such as a sloping windshield in place of the vertical, a curved cowl, lower seats in the front compartment and twelve varieties of color offered as stock. The five-passenger touring car sells for $935, the De Luxe touring at $995; the De Luxe roadster $995; coupe, $1,295, and sedan, $1,395. For $100 extra a complete set of Houk wire wheels is supplied. The upholstery is in Spanish brown or black long grain leatherette.

The Moore Motor Vehicle Co., Danville, Ill., has on exhibition a car on a 106 in. wheelbase, selling for $695. It is an assembled product with a Golden-Belknap & Swartz, four-cylinder, L-head engine, disk-in-oil clutch, Grant-Lees three-speed gearbox, Peru floating rear axle with Hotchkiss drive and 30 by 3½ tires. The car is furnished in either black or Brewster green.

In equipment the Dyneto lighting and starting is furnished with an 80-amp. Willard storage battery. Ignition is provided by Dixie magneto. The car is mounted on cantilever springs.

The Anderson Motor Co., Rock Hill, S. C., has a new car at the show in the shape of a convertible sport model which may be transformed from a roadster to a five-passenger model. The rear compartment can be closed over thus forming a rear-deck roadster, or when it is opened it uncovers a rear compartment which allows three additional passengers. This convertible model comes in two styles, one with divided front seats and the other with a solid front seat and entrance to the rear compartment through a door at the rear on the right side of the car. The convertible feature of the car is patented by the Anderson company.

De Luxe Type

The convertible model with the rear door is a larger type than the one with the divided front seat and is known as the De Luxe. The engine is larger in this model, being the new Continental 9 N, 3½ by 5¼ in. six-cylinder type. The other features of the car are similar to the standard Anderson product. The clutch is a Borg & Beck, the transmission a three-speed selective and rear axle is a Columbia.

One of the interesting features of the De Luxe convertible is the method of top adjustment for the roadster. There are two pillars which are concealed in the body just behind the front compartment and a curtain top which pulls over the front compartment on a spring roller. The De Luxe convertible sells for $1,925; the convertible sport, $1,465; four-passenger, $1,465, and the sedan $2,165.

A new car with a new design of overhead valve engine is being exhibited by the Templar Motors Corp, Cleveland. The car is an assembled product with the exception of the engine which has been designed in the Templar shops and will be

built by the company itself. The engine is a four-cylinder product of 197 cu. in. piston displacement and is claimed to develop 43 hp. at 2200 r.p.m.

The powerplant is a detachable head unit with 3⅜ by 5½ in. cylinder dimensions. The valve action is a rocker arm type with the rockers covered by an aluminum housing. The vertical push rods operate in a hollow space so arranged that there is a continuous oil vapor from the crankcase surrounding the valve action and keeping the parts lubricated. The valve rocker shaft is part of the pressure oil feed system.

The cylinder block is an iron casting and the crankshaft is aluminum. The pistons are cast iron and each carries four Wasson rings. The crankshaft has three main bearings and carries integral counterweights. The drive for the camshaft is taken off the crankshaft by silent chain. This chain also operates the generator shaft and the drive for the gear oil pump is taken off the camshaft.

Pump water circulation, Zenith carbureter, in conjunction with a Copley primer and Remy electric equipment compose the auxiliary units. Fuel is supplied by the Stewart vacuum system from a 15-gal. supply tank with a 2-gal reserve.

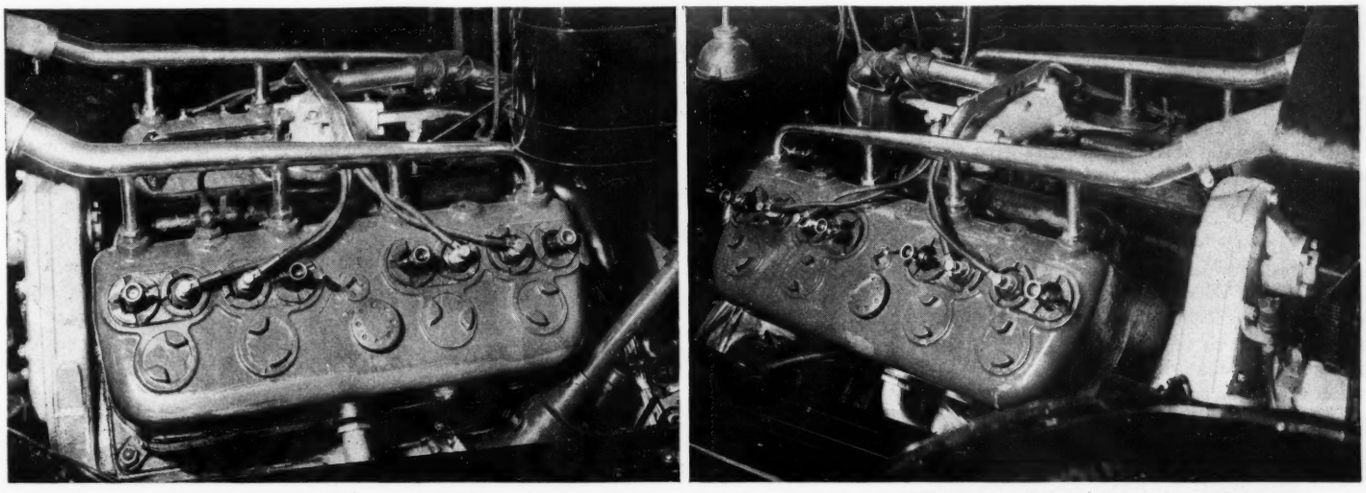
The clutch is a Borg and Beck single dry-plate with multiplying levers and ball bearing release. The drive is taken through a three-speed gearbox operating on New Departure ball bearings to a hollow propeller shaft with two Schwitzer universals and a semi-floating American Ball-Bearing Co. rear axle. The springs are semi-elliptic front and rear, the length being 54 in. in the rear and the bushings are Nigrum oilless type. The tires are 32 by 4 Goodyear cord, straight side. The five-passenger and the four-passenger sell for $1,985; the four-passenger for $2,155; two-passenger touring-roadster, $2,255.

Economy Guides Majority of Car Designers

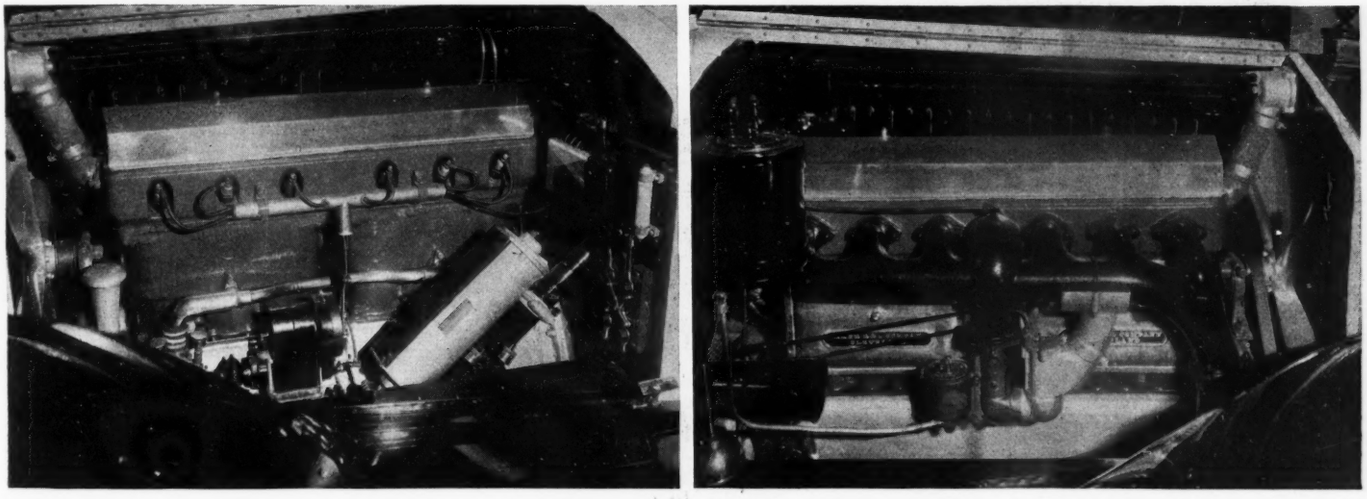
IF there is any particular motive that has guided a majority of designers as indicated by the cars at the Grand Central Palace, it is that of economy. For instance, in the inclosed car class the inside drive type of body has greatly increased in number, the underlying idea being that many car owners who heretofore have employed chauffeurs will henceforth drive their own cars, and the inclosed drive type of body materially makes a special appeal to these people. The same object may be discerned in the substitution of oil cups for grease cups on spring shackles and on many other parts of the car. Filling grease cups is a messy, tedious job, and if the owner has to attend to lubrication himself it is apt to be neglected.

With oil cups in these places, of such design that they can be readily opened and closed, much of the drudgery of lubrication is eliminated. In this connection it is not only the owner caring for his car in his own garage who has to be considered. Owing to the fact that an enormous number of young men have been withdrawn from the industries, most garages in the future will have to get along with a reduced force, and the cars stored at these garages will only receive such attention as this reduced —and in most cases less experienced—force can give them.

In engine design there is a defined tendency toward separate cylinder heads, one of the latest converts toward this practice being the Cadillac company. With such heads the decarbonization of the engine by scraping, which most garage men seem to consider the best all around method, is greatly facilitated. Probably another factor that favors this construction is that it does away with valve plugs and the placing of spark plugs in these plugs, which is a frequent cause of preignition trouble. The heavier fuels which must now be used having a somewhat lower temperature of igni-



Right and left sides of Peerless eight-cylinder engine with L-head cylinders



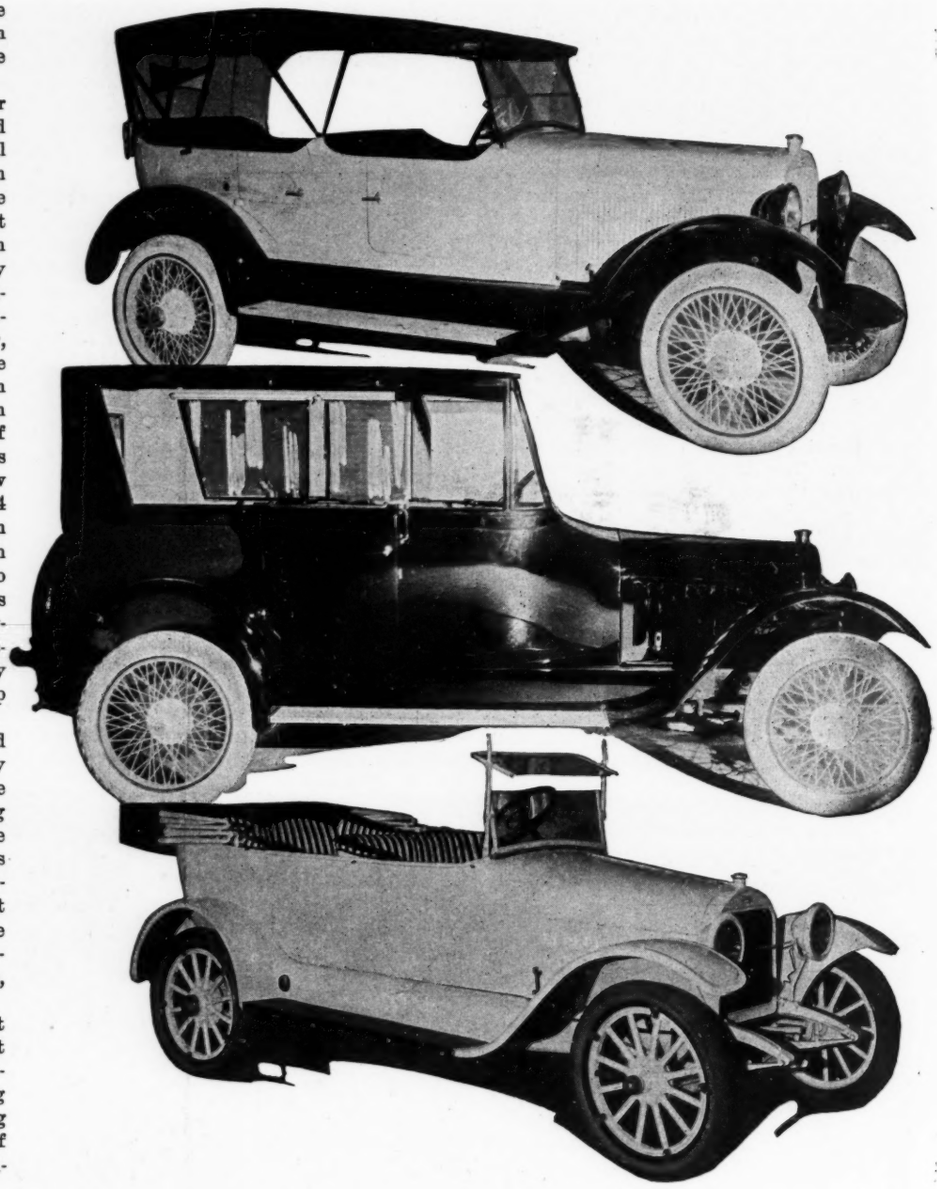
Right and left side of new Owen-Magnetic six-cylinder, the left view showing controller

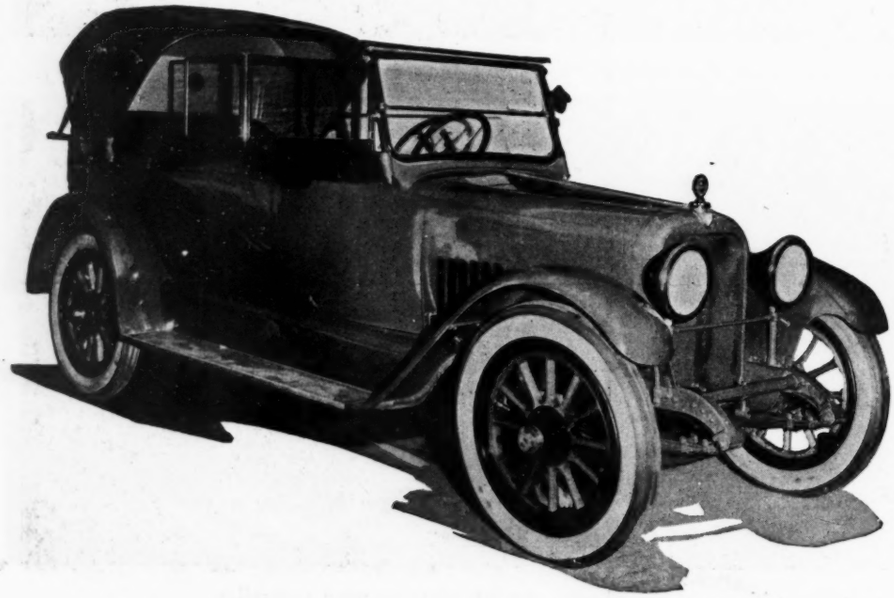
tion, every effort must naturally be made to eliminate hot spots in the combustion chamber wall, and the elimination of valve plugs tends in this direction.

Aluminum engines during the past year are continued by the firms that featured them before and this type of engine will probably see quite a boom when aluminum prices come down to normal again. The Premier company has made an important change in its design whereby the cast-iron cylinder liner is no longer surrounded by an aluminum shell but is fitted to the aluminum casting with packings at top and bottom. This results in the cast-iron liner, which is machined all over and therefore of absolutely uniform thickness, being in direct contact with the cooling water on its outside. Where with the old style of construction a clearance of 0.009 in. was necessary on the piston skirt, it has now been found possible to reduce this to 0.004 in. The advantage of this is twofold. In the first place it is well known that with aluminum pistons there is a tendency to piston slap when the engine is cold, this being due to the very considerable clearance which must be allowed with these pistons. If the clearance can be cut down by more than one-half, the cause of piston slap is largely, if not wholly, eliminated.

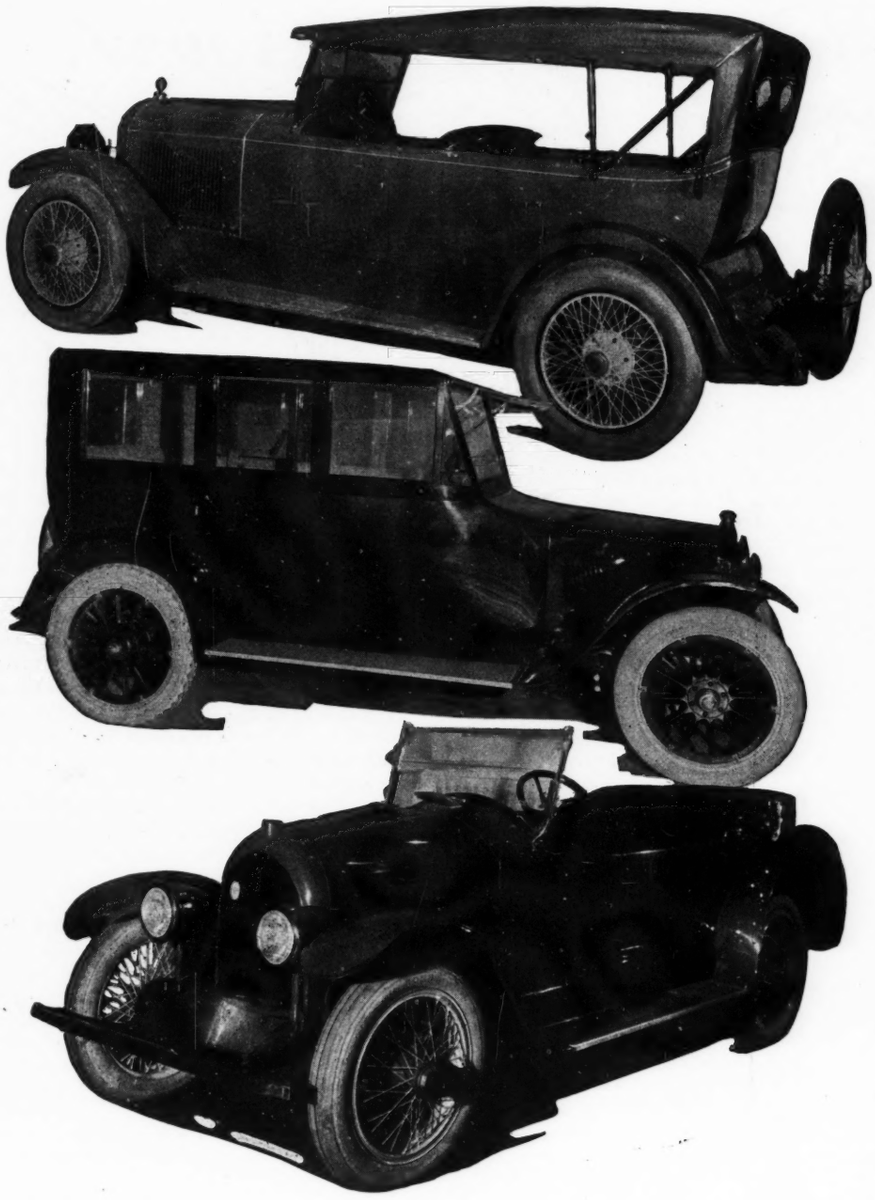
Every user of aluminum pistons has had to fight piston slap difficulty and a variety of solutions have been arrived at. The Packard uses the plan of slightly offsetting the piston pin from the piston axis. The Franklin company slots its piston skirts lengthwise from the open end to the wrist-pin zone. This permits of a very slight clearance on the skirt as the slots give the metal in the skirt a chance to expand without increasing the diameter and therefore, without creating a tendency to bind.

One of the perplexing problems that every designer has to contend with is that of accessory drives. The number of accessories has been constantly increasing and while there is no difficulty in finding a place and arranging a drive for each of them there has recently been a strong tend-





New Chandler touring car with well-designed center cowl, above. Just below it is the Chalmers convertible sedan model, while below it is the Moore touring car. At the left is shown the Mercer with Victoria top and folding tonneau windshield



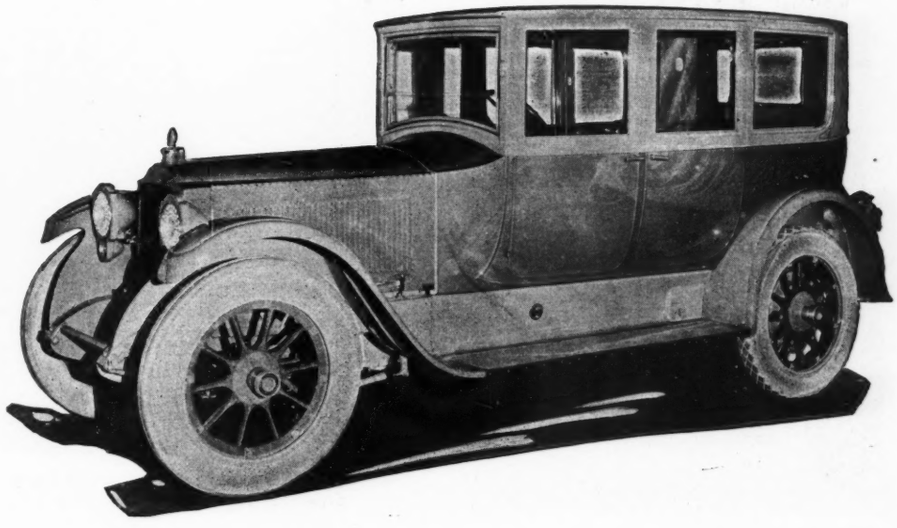
ency to clean up engines and chassis as well. It is very desirable that one drive be made to serve for two or more accessories, yet the possibility of an accident to one of these accessories interfering with the operation of the other must never be lost sight of.

There seems to be a growing tendency to use the same drive for the generator and the fan. This practice originated with makers of eight-cylinder cars where the generator is placed in the V between the two sets of cylinders and naturally comes at about the right height for the fan shaft. It has now been extended to four and six-cylinder vertical engines. In the Oldsmobile the generator is mounted in front of the engine on a pad with a vertical stem clamped in a bracket on the cam gear housing.

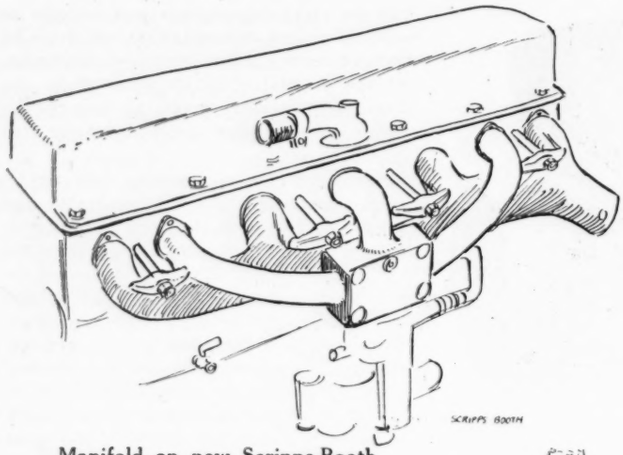
This provides adjustment for the belt. The Nash uses a similar construction, but in this case there is a sort of base at the rear end of the generator with oblong slots through which pass clamping belts to the cylinder block. In some instances where the fan is mounted on the generator shaft the drive pulley is in front of the fan. This results in quite a space between the fan and the radiator which is not conducive to the highest efficinecy.

There are few concerns which have not changed their manifold design during the past year. The air heater is now not a separate part but is incorporated in the design. Where in past years we used sheet metal or cast "stoves" clamped to the exhaust pipe or manifold which connected to the carbureter air intake by a flexible tube that often ran half way around the engine, the air heater is now formed integral with the exhaust manifold by short lengths of either rigid or flexible tubing. The hot air tube was especially obtrusive where the carbureter was located on the opposite side of the engine from the exhaust pipe. Where this is the case the pipe is now generally carried through the space between the two middle cylinders.

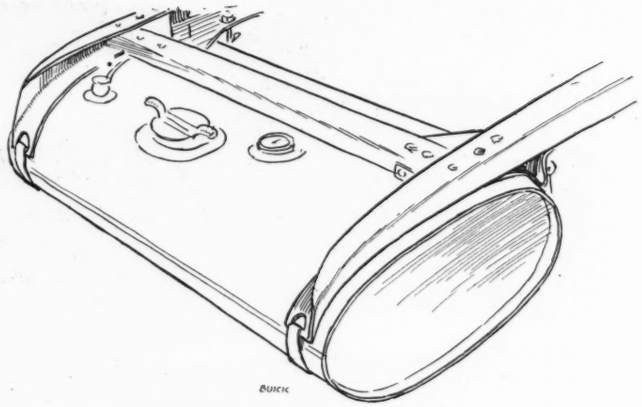
In recent years the unit power plant has been strongly in the ascendency. The first sign that this movement may possibly shortly come to an end may be seen in the new Studebaker chassis. This is prob-



Three-quarters rear view of Cole straight-line, bevel-edge touring car, above, showing sharp-edged corners at rear of tonneau. Just below it is the Hupmobile sedan on its new chassis, and below it four-passenger KisselKar with Silver sport type body in three-quarters left front view, showing oval-shaped lamps. At the right is the Packard straight-line sedan in double-tone brown



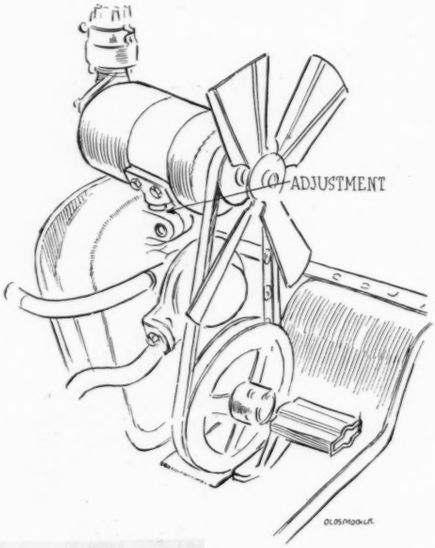
Manifold on new Scripps-Booth



Buick rear tank mounting

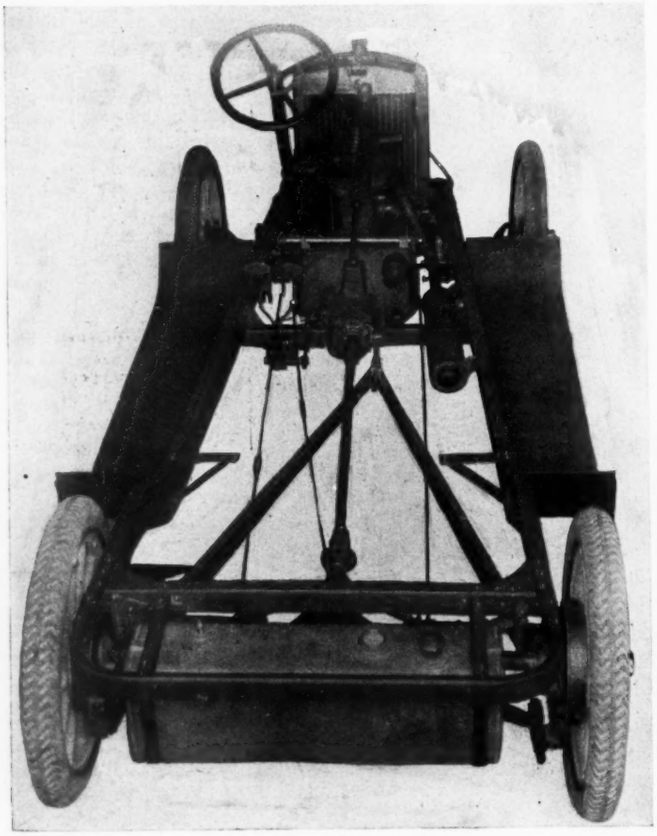
ably the first instance in years of a passenger car manufacturer having adopted an amidships transmission and discarded one differently located. The reasons for this move are not far to seek. Bell housings contain a large amount of metal which means a heavy expense if aluminum is used and great weight if—as is more customary in low and medium priced cars at present—cast iron is the material of construction. The inclose of the flywheel and a dry disk clutch serves no useful purpose but the fact that the bell housing holds the bearings of engine and transmission in rigid alignment has been an important consideration in the past.

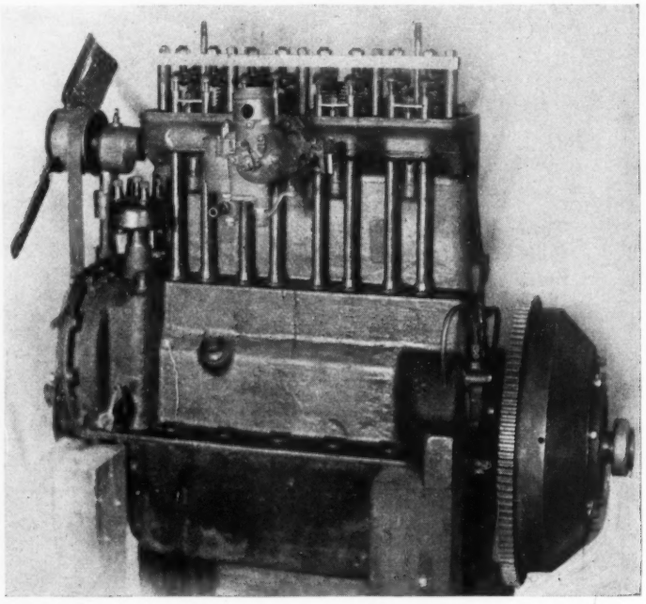
A little detail of construction noted on the new Studebaker is in connection with the brake pedal. Most brake pedal shanks extend substantially straight up from their hub for a certain distance and then turn forwardly to follow the inclination of the toe board. At the point of the bend a lug is formed on the shank to which the brake rod is connected by a yoke. In the Studebaker, as well as in several other designs, there is a separate arm on the pedal hub for the brake rod to fasten to, and in order that this arm need not be made very heavy it is braced to the shank of the pedal. The metal in the brace is almost in direct tension when the brake is applied, and therefore works to the best advantage.



Vertical adjustment of Oldsmobile fan and generator

In line with the general tendency to clean up chassis design the ignition wiring in some cars has been rearranged. In some of the lower priced cars the wires were carried from a distributer at one end of the engine to the different spark plugs across the tops of the cylinders. This involves the use of quite long high-tension cables, with corresponding chances of leakage and of trouble from electro-static effects, especially if the cables lie close together. Probably the chief objection has been, however, the unsightly appearance. This is now being attended to by neater arrangement.





View of Olympian chassis at left, and, above, the Olympian engine

New Devices at New York Show

Some of the Accessories Exhibited at Grand Central Palace

WITH some 250 parts and accessory makers among the 330 exhibitors at the New York show this week, new devices for the ease and comfort of driving are much in evidence at the Grand Central Palace. A complete resume of the accessories would be impossible at this time, so according to its custom MOTOR AGE is reserving its yearly review of the accessories to the Chicago show issue, Jan. 24. However, a visit to the accessory booths of a national show is always so productive of new devices that the following few descriptions are taken from among the hosts which are helping make this year's New York show memorable.

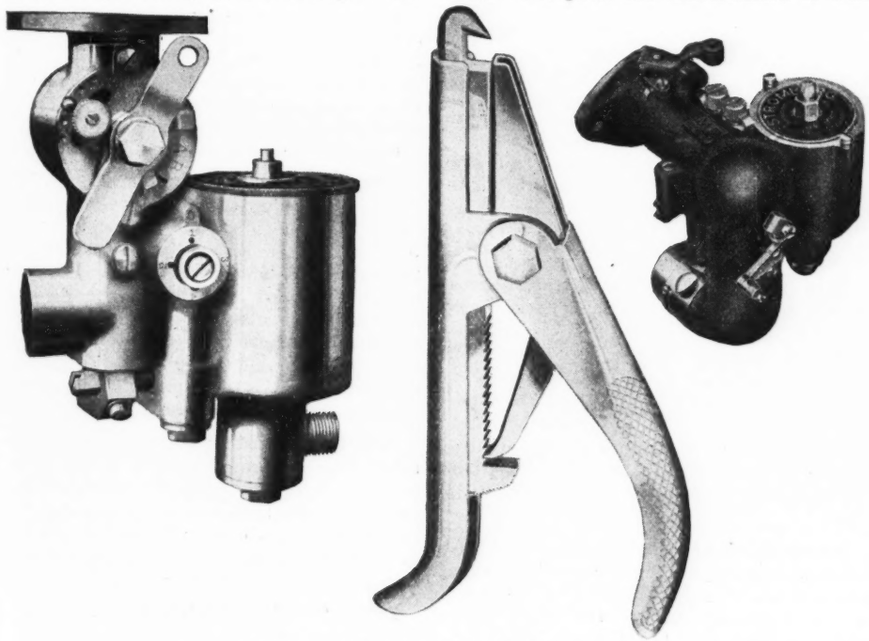
Letts Headlight Deflector—The Letts is a metal deflector held in place within the headlight by the lamp itself, which is screwed through a round opening at the top of the deflector. Projecting double oval wings reflect the ray backward and outward and direct it without absorbing the light. A 15-cp. bulb is recommended for use with the deflector. It can be adjusted so that the direct ray strikes the road at any required distance. The deflector fits all sizes of lamps and requires no tool for adjustment. Price, $1 a pair.—Hill-Smith Metal Goods Co., Boston, Mass.

Stromberg Carbureter—This Stromberg is a plain-tube type carbureter for Dodge Brothers cars, having the air passages of fixed size, while the gasoline is measured automatically by the air flow itself for all speed of loads by the air-bled nozzle construction. The gas jet is placed between the carbureter and manifold flange to prevent the possibility of air leakage. The dash control operates a butterfly valve in the air horn of the carbureter. It is interchangeable with the regular equipment. Price, $20.—Stromberg Motor Devices Co., Chicago.

House-Type Wire Wheel—The House wire wheel is designed for Ford cars locked by the hub cap which tends to tighten itself as the car advances. An inner pawl engages slots on the interior of the hub, which prevents the wheel from becoming loose should the car be backed for any distance. An ordinary wrench removes the wheel readily, the pawl being held out of action by the surface of the wrench when applied to the hub. Finish is standard enamel, black, white or red. List price, $50 per set.—Wire Wheel Corp. of America, New York.

Mosler Vesuvius Plugs—The Mosler plugs are now being made in two new styles for tractors and aircraft. The insulation used is Vitite, an American product, which has been developed to take the place of the European Steatite. The tractor types are ¾ and ½ in., respectively, the former for use in all tractors of half-inch pipe thread using a waterjacket, and the latter especially for the Hart-Parr and Fairbanks-Morse tractors. Price, $1.—A. R. Mosler & Co., New York.

Columbia Starting Batteries—The Columbia is a unit cell battery using no sealing compound between jars and case. It is sealed only in post-strap wells, so securely as to prevent any danger of the electrolyte escaping into the bottom of the case. The parts are standardized so that any plate combinations may be used with the same covers, connectors, etc. The case is impregnated by a special process which prevents penetration of the acid and no corrodable metal is used in the construction. The jars are tested for 30,000 volts and have a tensile strength of 4000 lb. with 4 per cent elongation. The maximum size variation permitted is $\frac{1}{64}$ in. The polarity is permanently visible by colored sealing rings, red for the positive and black for the negative terminal post. Prices, from $34.50 to $70.75.—National Carbon Co., Cleveland, Ohio.



Lacharnay carbureter, left, May's cotter pin puller, center, and new Stromberg carbureter

Asch Twin Spare Rims—Twin tire rims for Ford, Chevrolet and Saxon cars are being made to take the place of demountable rims for the special use of the small car owner. A display stand is furnished with each dealer's order for three or more outfits. The design fits both front and rear wheels and is furnished in 30 by 3 or 30 by 3½ sizes. Price, $7.50.—Asche & Co., Inc., New York.

Marvel Tire Life—This is a liquid to be injected into a tire, compounded in such a way that it will not harden or become gummy for some time but will remain in its original liquid state at uniformed density for an indefinite time. When, however, a slow puncture is formed in a tire the Marvel Tire Life, it is claimed, will form a thin protecting film against the actions of the air, stopping all slow leaks. One can contains enough tire life for treating one tire. Price, $2.50 to $4.50 per can depending on size of tire to be treated.—Marvel Tire Life Co., Kansas City, Mo.

Common Sense Shock Absorber—The main part of this device is bolted to the channel of the chassis over the center of the axle. It consists of a jaw through which passes a strap, one end drawn around the axle and the other end is secured by a small spring to the channel of the chassis 4 in. forward from the point where the main device is bolted on. When the car passes over a bump the coil spring pulls up the strap and on the rebound the jaws close, holding the strap fast and preventing a sharp return jolt. Price, per pair, for light and medium weight cars, $10; for heavy cars, $15.—Common Sense Mfg. Co., Newark, N. J.

Walden-Worcester Wrenches—Several of the former models of Walden-Worcester wrenches for Fords have been combined into new designs having several jaws, making new tools which do the work of more of the previous models.—J. H. Faw, Inc., New York.

Spoktype—Spoktype is a liquid to be applied to the points where wooden spokes are inserted in artillery type wheels. The liquid is designed to keep wheels from contracting and expanding in response to weather conditions. It is furnished in

The Gibraltar gear-type jack, which is operated by a large handle, is shown at the left, with a Peerless hood and radiator cover combined, while above appear, at left, Asch twin spare rim and National vulcanizer

cans, each can being sufficient to treat four wheels. Price, $1 per can.—Liquid Wheel Tightener Co., Modesto, Cal.

Prismolite Sun-Ray Lamps—The Sun Ray lamp is a new Prismolite product which both diffuses and refracts the light, shooting a long concentrated beam of road light ahead but also giving a side diffusion of 168 deg. Price, $1.75 per pair.—Prismolite Co., Columbus, Ohio.

Eureka Rim Compressor—An all-steel rim compressor of entirely new design has been added to the products of this company. The new compressor works like a jack on the ratchet and pawl principle. It has a 22-in. handle and may be folded up to 21 in. when not in use. Price, $6.—Eureka Rim Compressor, Inc., Addison, N. Y.

Gibraltar Jack—This is a gear type jack operated by a long handle which makes it unnecessary for the operator to reach under the car. The height of the jack lowered is 11¾ in. and raised it is 18 in. It will lift a 3-ton car and weighs 9½ lb. Price, $7.50.—Gibraltar Jack Co., New York.

Cox's Reinforced Bumpers—The Cox line of diamond rail bumpers has been improved by the adoption of the reinforcing metal strip which is fitted into the bumper and extends for its entire length excepting 2 in. on each end allowing space for a special cap expander. The reinforced diamond rail is furnished in three sizes, 1¼, 1½ and 1¾ in. The cap expanders referred to are of new design for holding the bumper caps in place. The company is making new brackets for bumpers on Overland, Nash, Dodge Brothers and Paige cars, and rear brackets for bumpers on Maxwell, Cadillac, Packard and Marmon cars.—Cox Brass Mfg. Co., Albany, New York.

Rico-Pedal Covers—Rico-Pedal Covers of live rubber have a mechanical adjustment which may be fastened by clips to all makes of square and oblong pedals. Price, per pair, $1.75 and $1.50.—H. C. Rich Auto Accessories Co., New York.

Warnola Products—New products offered by the Warnola Mfg. Co., New York, include a full line of horns and a connecting rod for Fords. Among the new horns is the Admonitor, a hand-operated type made in both right and left hand styles and finished in black enamel. Provision is made for oiling at one point, which takes care of the entire operating mechanism. It is equipped with a standard bracket which can be attached to any car. The connecting rod for Fords is of drop forging bushed with babbitt metal, machined and finished.

National Vulcanizer.—The National vulcanizer is called the 5-min. vulcanizer and consists of a compact mechanical device designed to do the work in the time specified.—National Motor Car Supply Co., Inc., 496 Mulberry street, Newark, N. J.

Lacharnay Carbureter—The Lacharnay carbureter is automatic and entirely independent of the engine for its operation. It has two spray nozzles in separate chambers, working independently or together in compensation, and fed from the same source. For idling and low speeds the small nozzle is used. In normal driving both jets operate in compensation. At high speeds the large nozzle alone supplies gas, while air is admitted through the smaller nozzle. Additional air intakes open automatically as needed. By a further movement of the throttle past the idling point, you not only shut off the gasoline, but an extra valve is opened and fresh air is let into the cylinders, acting as an air brake when going down hill. In addition it cools the cylinders and prevents the accumulation of oil on top of the pistons.—Lacharnay Carbureter Works, Paterson, N. J.

U. S. Buffer and Grinder Attachment—New models of U. S. air compressors are being fitted with a buffer and grinder attachment which is secured to the base of the air compressor outfit and driven by a belt from the main shaft of the engine. The stone wheel is 10 in. in diameter fitted at the left of the device and the 10-in. wire buffing brush is at the right.—United States Air Compressor Co., Cleveland, Ohio.

Brewer-Titchener Top Sockets—The self-raising feature of the Brewer-Titchener one-man top sockets consists of a long coil spring concealed within the main tube which is used with the company standard one-man type of sockets so constructed that the weight of the complete top is counterbalanced by the spring, thus making a top which is raised or lowered with the least possible effort.—Brewer-Titchener Corp., Cortlandt, N. Y.

May's Cotter Pin Puller—This is a device shaped somewhat like a ticket punch. The action of the handle draws in a heavy steel sliding hook which is fitted into the lower jaw of the puller. The jerk on this hook combined with the pulling force of the operator makes the removal of cotter pins an easy matter.—Brewer-Titchener Corp., Cortlandt, N. Y.

S & M Spotlight—A press button switch fitted into the rear of the lamp which turns the light either off or on by the same motion is the feature of the S & M spotlight. The reflector is of solid spun brass triply silver, and the outer casing is of pressed steel finished in black enamel and nickel trimmed. Price, $12.50.—Consolidated Sales Co., San Francisco, Cal. No illustration in folder.

Peerless Radiator for Fords—This combination radiator, hood and shield is an addition to the other lines of Peerless radiators which was made particularly to convert the 1915 and 1916 Ford car into the appearance of the latest model. It gives the car a streamline effect, the hood being tapered to insure the proper fit and effect when assembled on a car. Price, $35.—Corcoran Mfg. Co., Cincinnati, Ohio.

Titeflex Muffler and Exhaust Pipe—This device is a corrugated metal pipe having a single wide deep groove of helical form into which are screwed the fittings attached to the exhaust manifold. The corrugation permits bending to the desired form without flattening. The exhaust gases are deflected by the corrugations, thereby deadening the noise. The noise of the exhaust is deadened further by a defectro strip in the rear end.

Non-Gran Bushings—Non-Gran high-speed bearing bronze now is made up in finished bushings specially adapted for Ford cars for the greater convenience of dealers and repairmen. These are carried in stock for immediate shipment.—American Bronze Corp., Berwyn, Pa.

Raybestos Disk Clutch Facings—These facings are now furnished direct to dealers, packed in boxes ready for use and marked for car type and size. They are

adapted to every type of car. Each box contains twenty rings.—The Raybestos Co., Bridgeport, Conn.

The Belknap Electrical Air Heater—The Belknap heater is an electrical heating unit for preheating the air taken through carbureter. It is arranged for any voltage, uses about 5 amp. and may be attached to any car.—Charles H. Belknap.

New Povasco Wheels—New finger grips are the features of the two wheels of the Povasco line. These grips are directly underneath the rim instead of on the inside edge as is customary. A truck model and passenger type are offered, finished in black or tan with malleable iron, brass or aluminum spiders.—Pouvail Smith Corp., Poughkeepsie, N. Y.

Peters & Herron Tire Covers—This is a new line of tire covers of enameled duck fabric furnished in many combinations of fancy colors and made for all tire sizes.—Peters & Herron Dash Co., Columbus, Ohio.

Coffin Garage Wash Lamp—This model is similar to the previous types of garage lamps except that it has an elbow about 4 ft. from the ground and another elbow and swivel at the top of the stand, which is 11 ft. in height.—Coffin Valve Co., Boston, Mass.

New Guarantee Liquid Measure—The air valve in these liquid measures has been combined with the electrical switch into one piece of mechanism and placed inside the pedestal so that when the metal door is locked the instrument cannot be tampered with by any unauthorized person. The new line is called the Underwriter's model, as it was adopted in accordance with recommendations of the Board of Fire Underwriters. Other models will be discontinued. Price, $330.—Guarantee Liquid Measure Co., Rochester, Pa.

Centrifugal Clear Sight—The Centrifugal Clear Sight windshield device is an entirely novel design. It consists of a circle of glass fitted into a circular hole in the windshield and revolving at 1800 or more revolutions per minute, the centrifugal force keeping the glass clear of any rain, snow or dirt that might collect. The power is derived from a tiny cylindrical motor, 1 in. in diameter by 1½ in. in length. The motor is driven from the electrical system of the car or by dry cells, the wires being connected with the motor through the horizontal bar. Six volts is required to operate the mechanism, which draws about 1 amp. Furnished as special equipment, price $20.—Automobile Devices Co., Philadelphia, Pa.

Dunham Heater For Fords—This heater is mounted on a floor board which may be inserted in place of the regulation floor board in a Ford car. The heat is furnished to the register from the exhaust pipe and is distributed evenly by baffle plates in the registered drum. Price, $5.—Thomas Dunham Co., Laroy, Ill.

Rayfield Thermostat—An instrument to control the cooling temperature of a motor car, truck or tractor engine having four circulations, known as the Rayfield Thermostat, is designed to stop circulation in the cylinder block when the engine is cold but does not prevent water circulation in the radiator. This is accomplished by two butterfly valves linked together in connection with the expansion coil which opens the upper valve and closes the lower one when the circulating water reaches a temperature of 170 deg., thus permitting circulation through the radiator, whereas if the engine is cold, the upper valve is closed and the lower one open, the water circulating through the radiator and pump only. The water in the cylinder block gradually is displaced until all the water in the system is raised to the pre-determined temperature, which in this case is 170 deg. Fahr. Price, $15, extra fittings varying from $1.55 to $1.05, depending upon the make of the car.—Findeisen & Kropf Mfg. Co., Chicago.

Sun-Ray headlight, left, Admonitor horn, center, and Letts deflector

Rico foot pedal covers

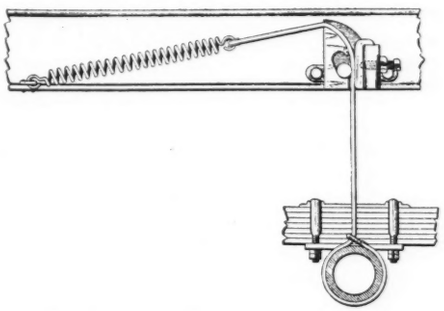


Diagram of Common Sense shock absorber

EverGood Bumpers—New brackets and other changes have been introduced into the EverGood line of bumpers which has been completely redesigned for the coming year. The most noticeable change is that most of the brackets are now tubular in shape. There also are special brackets made for splash pan cars. The new line includes special types for Cadillac, Dodge Brothers, Ford, Chevrolet and Saxon cars and rear bumpers for Packards.—Emil Grossman Mfg. Co., Brooklyn, N. Y.

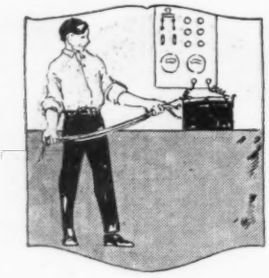
Minute Demountable Wheel—The Minute demountable wheel set for Ford cars consists of four main hubs to fit on the axle spindles, all the auxiliary parts for five wheels, an extra wheel and the Minute wrench. The Ford wheels are retained, the hubs only being taken out and replaced by Minute hubs. The extra wheel furnished is 30 by 3½, plain clincher rim for Ford cars. Price, including a full set of Minute hubs and an extra flange, $30.—Hill-Smith Metal Goods Co., Boston, Mass.

Wilson Woven Hair—Wilson woven hair is special treated and adapted to motor car seats in which the hair is woven on burlap. It is made in sheets from ½ to 3 in. thick and can be cut to the exact shape of the cushion.—Wilson & Co., Chicago.

Woodworth Clearlite Lens—The upper part of the Woodworth lens is composed of a waving surface molded on the inside of the glass, the waves extending vertically. The lower half has a series of prisms, extending horizontally, also on the inside of the glass, deflecting the light downward on the road. The device is made for all types of cars. Price, from $3 to $4.50 a pair according to size.—Woodworth Mfg. Corp., Niagara Falls, N. Y.

Splitdorf Munger Piston Ring—The Splitdorf is a one-piece concentric piston ring, the joint being made by a double cut giving a close seat at an angle with the face of the ring. It is claimed that the expansion joint of the ring is so designed that there is no change in its tightness due to wear of the ring. The surface of the ring coming in contact with the cylinder wall is not polished but is finished with minute grooves to insure a perfect seat, any loss in diameter of the ring due to wear being automatically taken up by the expansion joint. These are made for all size cylinders. A special Ford assortment consists of eight regular and four over-size rings with grooving tool, insertion tool and full directions for use.—Splitdorf Electrical Co., Newark.

Gasoline Tonic—Gasoline Tonic is designed to increase the mileage and to remove carbon. By its chemical action on gasoline it dissolves and splits up unexploded particles so that the carburetor can vaporize them with the rest of the fuel. Owing to the more complete explosion and the cleaner combustion there is no residue of carbon, it is claimed, and the effect is gradually to eat away and remove accumulations of carbon left by previous incomplete combustion. The fluid is a by-product of petroleum, non-inflammable, without acids or injurious chemicals or anything that can harm metals or hurt the engine, it is said. Price, $2.50 a quart can, $7 a gallon, $30 for 5 gal.—Standard Chemical Co., Los Angeles, Cal.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the seventy-seventh installment of a weekly series of articles begun in MOTOR AGE. *issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York, in a size to fit the pocket conveniently.*

Part LXXVII—Starting, Lighting and Ignition Systems

THE primary purpose of every wiring diagram of a starting, lighting or ignition system is to show the proper electrical connections between the various devices which go to make up the complete systems. These wiring diagrams are often quite a puzzle to the inexperienced man, and also to the man who has not taken time to give these the necessary consideration in connection with the installation, maintenance or repair of the different systems which he has worked upon.

One of the chief reasons why a wiring diagram is of no real assistance to the majority of men working on the electrical equipment of motor cars is due to their lack of a clear conception of the proper operation of the various electrical circuits which go to make up the complete systems. Another, and almost equally important reason, is the lack of sufficient imagination to follow along the various electrical circuits just as though the wires and different devices were suspended in space and absolutely independent of all other parts of the car. The relations of the component parts of starting, lighting and ignition system were shown in Fig. 429. The various electrical circuits were traced in detail for practically all conditions of operation of the different combinations.

The actual locations of the different parts of a starting, lighting and ignition system similar to the one shown in Fig. 429 as they would appear on the car are shown in Fig. 430, which might be called a ghost view of the electrical equipment and circuits. The various electrical circuits traced in Fig. 429 easily may be traced in Fig. 430 by using exactly the same description as the same lettering has been used in both cases. Such a diagram should be of great value to the repair man in tracing the actual electrical circuits on the car, as he, by reference to this kind of a diagram, easily can identify each individual conductor, the circuit to which it belongs and the current it is supposed to carry under normal conditions. Diagrams of this kind will be given in connection with the leadng makes of systems to be described later.

A type of wiring diagram usually supplied by the manufacturers of starting, lighting and ignition equipment is shown in Fig. 431. This is a diagram of the same system shown in Figs. 429 and 430, and the same lettering has been used in designating the different parts, wires and connections as was used in Figs. 429 and 430. It thus is seen that the wiring diagram itself merely gives the different electrical connections without reference to the relative location of the different parts and devices forming the various electrical circuits.

Analysis of Trouble

The various kinds of individual troubles which may occur on any particular system are so numerous that it would be impossible to expect the reader to wade through a detailed description of each and every one. A description of the more important ones and those that are most likely to occur will be given, and with these as a basis the reader may go on and study the more uncommon cases and perhaps more complicated cases.

You must have in mind that there are three things associated with every electrical circuit, namely, the resistance of the circuit which opposes the free movement of the electricity

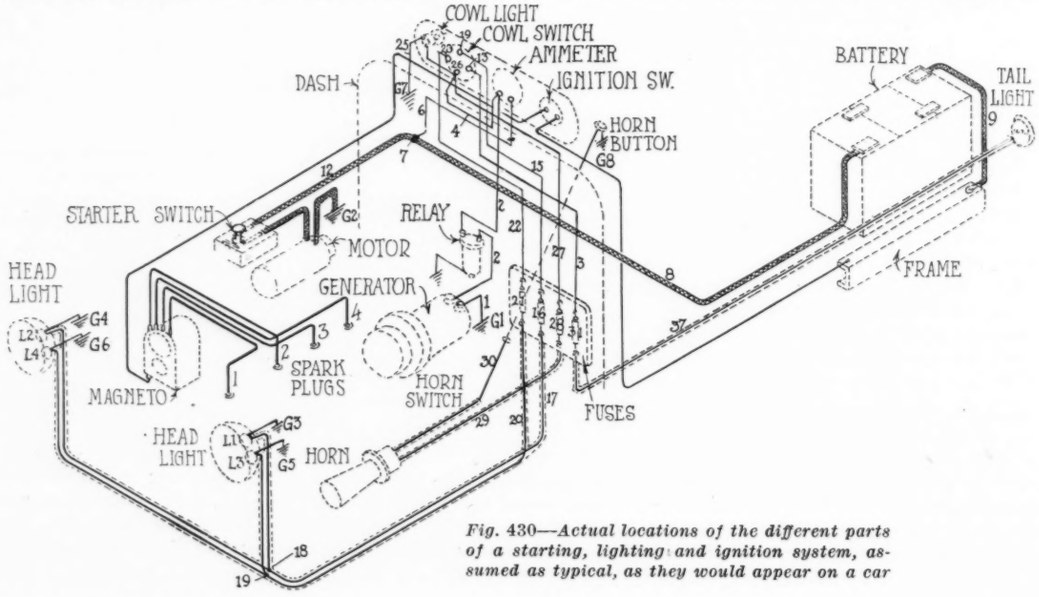


Fig. 430—Actual locations of the different parts of a starting, lighting and ignition system, assumed as typical, as they would appear on a car

around the circuit, the electrical pressure, or electricity moving force which causes the electricity to move through the circuit, and the electric current which is a measure of the rate at which the electricity is moving just as the current in a river is a measure of the rate at which the water is moving down the river. The rate at which the electricity, or the current, moves in amperes is equal to the effective electrical pressure in volts acting in the circuit divided by the resistance of the circuit in ohms. Thus if a lamp circuit has a resstance of 2 ohms and the electrical pressure in this circuit is 6 volts, a current equal to 6 divided by 2 or 3 amperes, will be produced when the circuit is closed. The effective pressure as used means the difference in the sum of the pressure acting in one direction around the electrical circuit and the sum of the pressures acting in the opposite direction. Thus if a generator having a terminal pressure of 7.5 volts is charging a battery whose terminal pressure is 7 volts, an effective pressure of 7.5 minus 7 or .5 volts will be acting in the circuit.

In order that there be an electrical current in any circuit an effective pressure must be acting in the circuit and the circuit must be closed. So in any electrical circuit in which there is no current the difficulty is due to there being no electrical pressure in the circuit or the circuit is not closed. For example, if the ammeter indicates zero current when the headlights are turned on, see Figs. 430 and 431, you immediately know the difficulty, either there is no electrical pressure or the circuit is open. If at the same time the cowl and tail lights operate normally, you immediately know that the difficulty is not due to a lack of electrical pressure but to an open circuit. An inspection of the diagrams in Figs. 430 and 431 will show that all the various light circuits have certain wires and connections in common. That is, starting with the frame of the car, you can pass along wire 9, through the battery along wire 8 to the junction point 7, along wire 6 and through the ammeter along wire 4 to terminal 26 on the cowl switch, where the circuit branches to the horn, the cowl light and the tail and headlights through the cowl switch. If the cowl and tail lights operate, all connections and wires along the circuit just traced are O. K. up to the terminal 26 on the cowl switch. If neither the low- nor high-candlepower bulbs will burn, the difficulty is more than likely in the switch, although both fuses 21 and 16 may be burnt out. The fuses may be tested by connecting the terminals with a pair of pliers or a short piece of wire, thus closing the circuit if the fuse is burnt out. The connections in the switch may be tested by connecting terminals 26 with terminals 23 and 19 respectively.

If neither of these tests locate the difficulty, the circuit is open at some other point or it may be open at both the fuses and switch, in which case neither of the tests would locate the trouble. A test lamp whose voltage corresponds to that of the headlights may be used as follows in locating the difficulty. Mount the lamp in a socket provided with flexible terminals several feet long and connect one of the free ends of the flexible wire to the frame of the car and the other to terminal 26 on the cowl switch. If the test lamp lights it is O. K. and the circuit is, of course, O. K. up to the terminal 26, as the cowl light burned. Turn the cowl switch so the high-candlepower light should burn and then connect the free terminal of the test lamp to the terminal 19, and if the test lamp burns the switch is O. K. If the lamp does not burn, the connection in the switch is at fault. If the switch is O. K., proceed to the right-hand terminal of fuse 21 and again test. If the test lamp burns, wire 22 is O. K. Then touch the left-hand terminal of fuse 21, and if the lamp burns the fuse is O. K. Next go to junction point 19, if it is possible to make electrical connections there; if not, open up headlights and test circuits by applying end of test circuit to terminals in lamp sockets. Proceed along the circuit in this manner until you reach a point on the circuit where the test lamp does not light. The circuit is open between this point and the last point where it did light. This same line of reasoning will apply to every electrical circuit on the car, and difficulties caused by open circuits easily may be located by following carefully the wiring diagram.

The importance of the wiring diagram in locating cases of trouble thus is readily seen, and you cannot become too familiar with these diagrams for the different systems.

If the system happens to be grounded at some point that is not supposed to be grounded you can test for such a ground as follows. First remove all grounds from the system as shown in the wiring diagram. This may be done by disconnecting the grounded terminals of the battery and the grounded terminal of the generator and removing all lamps. The ground connection for the horn circuit and starting motor circuit should not interfere with any test on these two circuits, which are open at the horn button and starting switch respectively. Now connect the terminal of the battery, which normally is grounded to the frame of the car by the test lamp circuit. If the wiring to which the other terminal of the battery is connected happens to be grounded, the lamp will light, provided the resistance of the ground connection is not too high. The different light circuits then may be tested by disconnecting them in turn from the battery by taking out the fuses or loosening the wires from under the screw terminals if no fuses are in the circuit.

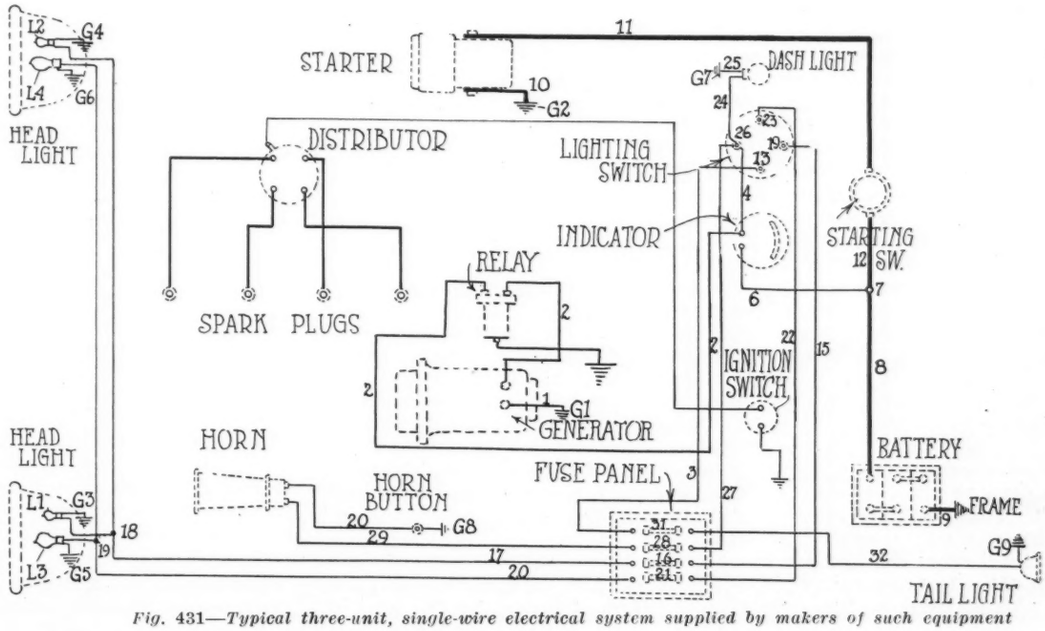


Fig. 431—Typical three-unit, single-wire electrical system supplied by makers of such equipment

Are You Learning to Drive Now?

Marine corps officers congratulate Katherine Stinson on record flight in which she flew a plane without a stop from San Diego to San Francisco in 9 hr. 10 min.

THERE would be fewer accidents and less expense to motorists in general, and more joy to life for both pedestrians and motorists, if the latter would exercise the same amount of care about learning to drive a motor car as he does about going into deep water when learning the art of swimming, is the opinion of Ray McNamara, road engineer for Maxwell, who mentions this in discussing learning to drive.

To learn to drive one should select a wide city block or a good country road free from dangerous curves, at a time of the day when traffic is light, for the first lesson. The general practice is to familiarize the student with the steering of the car first. Dealers should see that the new owner gets a general idea of just what each lever is for. Then take your place at the wheel and learn to start and stop first. A dozen or even a hundred attempts should be made until the owner is thoroughly confident of a quick stop without getting rattled. When this is done it is time to move along at a moderate speed not exceeding 15 m.p.h. The instructor having acquainted you with the operation of gear levers, brakes and throttle, practice stopping at imaginary objects along the road, turn corners slowly, turn around in the road and go the other way several times. Among other recommendations in learning to drive are these:

For the sake of experiment and your own information draw two lines across the road 50 ft. apart. Then move the car toward the lines at 20 m.p.h., crossing the first line, apply the brakes and see just how many feet it takes to bring your car to a dead stop. Unless your brakes are 100 per cent efficient, you will find it very difficult to stop well within the lines. This trial will give you an idea of just what speed is safe in approaching railroad crossings and intersecting streets and how near you can go to traffic obstruction before stopping.

Short tours of a few hours' duration each day are splendid practice before exposing your family or friends to busy city traffic and dangerous railroad crossings. These tours should be made over roads free from steep hills, dangerous turns and at an hour when traffic is light.

Never cross a railroad unless positive that the tracks are clear, even if necessary to get out of the car and walk ahead. In and about our large cities there are many crossings where the gateman or flagman is off the job after 6:30 p. m. In such cases it is necessary to be extra careful and you are almost compelled to get out of the car to see if the road is clear.

French Woman Drivers

If you drove for the French government you would do so under the authority of a circular bearing the mystic letters and numerals "14716 S.A./3," which makes possible the employment of women in the motor vehicle service on the lines of communication in the V, VII and XI military regions. The circular stipulates an engagement of three months, the wearing of a suitable uniform, and submission to such military discipline as may be deemed necessary.

Madame Jeanne Pallier of the Automobile Club Feminin in Paris has gathered together scores of women for war work of a special kind. Madame Pallier herself belongs to the pre-war aviation days. She won the *coupe femina* the year before the war; drove a motor truck for a while; evacuated hundreds of wounded from Paris hospitals and railway stations and then turned to mobilizing Paris society women and their cars for war work. The men are allowed only to be contributing members—cars and money. They cannot send their chauffeurs to drive the cars contributed, but they may send their wives, daughters or sisters as drivers.

Stretching the Meat

If you are saving meat these days by eliminating some of the all-meat dishes here are a few dishes in which a combination with potatoes stretches the meat flavor and makes an appetizing member of the menu family.

Potato pie—To 1 qt. of hot boiled potatoes add enough hot milk to moisten. Season with butter and salt. Mash in kettle in which the potatoes are boiled and beat with a fork until light. Stir in half a cup of minced ham. Have four hard boiled eggs ready, with half a cup of stock or gravy. Arrange the potatoes and sliced eggs in dish in alternate layers with potatoes forming the top and bottom layers. Moisten with the gravy. Brush over the top with milk or egg and brown in hot oven. This dish can be arranged in three layers with the middle layer some kind of heat hash bound together with egg or thickened gravy.

Turnovers

Potato turnovers—Boil and put through the ricer enough potatoes to measure a pint. Add a well-beaten egg, a tablespoon of flour and season with salt. Turn on floured board, roll out and cut in circles the size of a saucer. Place on each a large spoonful of fry hash seasoned with onions and parsley chopped fine. This hash should be dried or bound together with thickening. Double over and pinch together like a turnover, place on a greased baking sheet and brown in a hot oven. Serve with a thickened sauce made from the gravy in which the meat was cooked or with a tomato sauce.

Family potatoes—Use six cold or freshly boiled potatoes. Cut into quarters and put in saucepan with a pint of gravy or soup stock. Add a chopped onion, salt and a little red pepper. Simmer on back of stove half an hour before serving.

Potato roll—Heat a pint of mashed potatoes and half a cup of milk in a saucepan. Add a tablespoon of chopped parsley, salt and a little red pepper, or paprika. Stir in four well-beaten eggs and mix thoroughly. Remove from fire and beat until light. Heat a tablespoon of fat in frying pan and spread the potato mixture evenly over the pan. Cook until it is a golden brown. Roll like an omelet and serve smoking hot.

Red pepper, or paprika, is preferable to black pepper in these potato dishes.

The Motor Car Repair Shop

Care of Truck Tires

IT becomes increasingly urgent with the government demanding the bulk of the solid tire output for motor transports that owners of commercial vehicles must concentrate immediately all attention on conserving their tires. Truck tire authorities assert that only by the finest co-operation from truck owners will manufacturers be able to supply the government with the five hundred thousand solid tires they will need to enter actual hostilities on a lavish scale. Therefore, possessors of commercial vehicles, on whom the government must rely to relieve the freight congestion and speed produce from the farm to the consumer, should commence at once a policy of conservation. Increased use of the motor truck means increased tire wear and gasoline consumption.

Do Not Overload

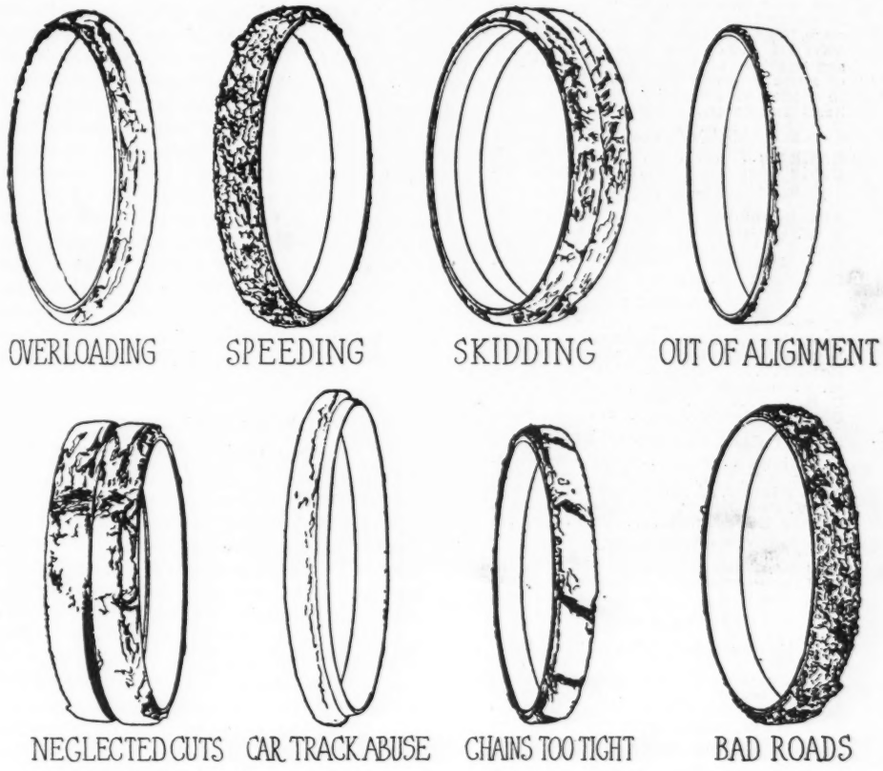
In the desire to get the very most out of the motor truck the owner is apt to overplay his hand and overload his truck. The consequence is more disastrous on the tires than on any other element of the vehicle. A glance at the illustration on overloading will give one an idea of the damage accruing from this common fault. And there is only one prevention: keep within the capacity of the truck.

Below is a table of the carrying capacity that single and dual tires will bear.

There is positively no remedy for a tire broken down from overloading. The reason is that the rubber has been compressed beyond the safe limit of elasticity. Little cracks occur and the deterioration commences. The overloading of a truck once suffices to begin the destruction of the tire. Because a tire is solid many people believe it escapes one of the destroyers of the pneumatic tire, namely heat. Yet it is a fact that heat is as disastrous to solid tires as it is to inflated tires.

Heat makes its appearance in overspeeding. When a pilot sends his truck, loaded or unloaded, pell-mell over a smooth or rough road the heat that is generated within the tire, due to rapid displacement and road friction, is serious enough to cause a permanent injury. It does not take long for disintegration to take place.

In one of the illustrations we have the effect of skidding. Drivers should be brought to realize that their trucks will stop quicker if the brakes are applied gradually rather than quickly. Also they should be admonished against rapid turning of corners. Repeated skidding had worn the tire in the pictured illustration to pieces. Another thing: If one brake takes hold before the other the tire is bound to skid. This develops a flat spot on the tread and the next time the same emergency arises this same spot is the sufferer as the wheel will not skid until this one place on the tread has been reached.



On first glance at the illustration marked out of alignment one would say that the tire had given satisfactory mileage. However, this tire was taken from the front wheel of a truck whose wheels were out of alignment. The effect upon the tire is a continual friction. The wheel out of kilter partly rolls and partly slides and the tread disappears quickly. If a driver notes a scaly appearance on his tread he should remedy his alignment immediately. Hard jolts cause this trouble.

Neglect of cuts is portrayed in the next illustration. The driver evidently had driven over broken glass, etc., and ignored the cuts, with the result they widened as the truck progressed. Tire cuts should be healed with cement or trimmed to lessen resistance. In large cities the fault exemplified in the next illustration is most noticeable. The truck has been driven in car tracks. One-half the tire has carried the load while the other half has been cut to pieces in tracks.

All anti-skid devices have been found injurious to solid tires but the least injurious is the loose chain. In the illustration the anti-skid contrivance has been of the permanent type and has eaten into the surface of the tire. Anti-skid devices should be used when only vitally necessary. While bad roads cannot be avoided the pilot who uses the bad road simply because it will cut off distance risks permanent injury to his cushions. The tire is the exhibit of a concern whose driver specialized in driving over crushed stone, loose brick and other similar obstructions.—The B. F. Goodrich Rubber Co.

CARRYING GCAPACITY OF SINGLE AND DUAL TIRES

Singles						Duals				
Width of Tire.	Height of Tire.	Width of Wheel.	Diam. of Wheel.	Carrying Capacity.	Nominal Size of Tire.	Width of Tire.	Height of Tire.	Width of Wheel.	Diam. of Wheel.	Carrying Capacity.
			28		34x5				28	
5½	3¼	4¼	30	2500	36x5	11⅝	3¼	10	30	7000
			34		40x5				34	
			36		42x5				36	
			28		34x6				28	
			30		36x6				30	
6½	3¾	5¼	32	4000	38x6	13⅝	3¾	12	32	10000
			34		40x6				34	
			36		42x6				36	
7½	3⅞	6¼	30	6000	36x7	15⅝	3⅞	14	30	12000
			34		40x7				34	

"Motor Trucks of America."

The 1918 edition of "Motor Trucks of America," of which S. V. Norton, manager of truck tire sales of the B. F. Goodrich Rubber Co. is author, will be ready for distribution Jan. 1. The book, consisting of 200 pages of reading matter, illustrations and specifications, is the sixth to be issued in as many years. Complete specifications of nearly 150 of the leading gas and electric-driven motor trucks are contained in the volume. The illustrations are of the latest models.

The Readers' Clearing House

TO assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, such as ignition, carburetion, etc., MOTOR AGE has inaugurated the segregation of inquiries into classes of allied nature. Questions pertaining to cooling will be answered under that head and so on.

VALVE TIMING

E. Bloom.....Oblong, Ill.
David Speer.....Pittsburgh, Pa.

EXPERIENCES

Alec Leonard.....Crystal Falls, Mich.
E. B. Whiting.....Branford, Conn.
Otto E. Gunstrom..Crystal Falls, Mich.
E. L. Branson....Battle Creek, Mich.
Dr. Charles R. Kerr.....Anchor, Ill.

ENGINES

E. Sanchez Marti.....Havana, Cuba
T. B. Holt.....Maysville, Okla.
I. Carl Mitchell.....Greensburg, Ind.
Reader.....Waterloo, Iowa
H. Y. MacAlpine.....Chatham, Ont.
C. R. K.....West Frankfort, Ill.
George Huyck.....Topeka, Kan.

THE ELECTRIC SYSTEM

T. B. Holt.....Maysville, Okla.
Subscriber.....St. Louis, Mo.
J. B. Plasic.....Fort Jennings, Okla.
R. W. Pennington Spokane, Wash.
Homer Boyd.....Sullivan, Ill.

REBUILDING

Carl W. Abbott.....Quincy, Ill.
F. J. Schmerheim.....Saginaw, Mich.
E. C. Dell.....Dallas, Tex.

MISCELLANEOUS

Fred V. Kreemer....Jewell City, Kan.
L. A. Hill.....El Paso, Tex.
Ford Driver.....Chicago
E. S. Hayashi.....Hilo, Hawaii
Subscriber ..... Chicago
A. G. Waterhouse..New Haven, Conn.

FOULING FORD PLUGS

John H. Erkmann.....St. Louis, Mo.
William Morrow.....Antioch, Tenn.
Clayton Smith.....Iowa City, Iowa

No communication not signed by the writer's name and address will be answered in this department.

Valve Timing

Timing Hupmobile 32

Q—Give explanation for timing a Model 32 Hupmobile. Will the wear in the chain throw motor out of time in any way?—E. Bloom, Oblong, Ill.

In order to time the valves first remove the inspection plate on the gearset housing so that the marks on the flywheel will be exposed to view. Then draw a line exactly in the center of the opening and parallel to the frame of the car. Next turn the engine over until the line marked EC 1-4 on the flywheel coincides with the line drawn on the gearset case. Then remove the valve cover and by means of the fan pulley turn the camshaft until the exhaust valve on No. 1 cylinder has just closed. This point of closing can be determined by placing a slip of paper between the tappet and the valve stem as the paper will slip just as the valve seats. The camshaft and crankshaft are now in proper relation to each other.

It will now be necessary to time the magneto and to do this remove the breaker box cover and the distributor plate after placing the magneto in its fully retarded position, that is the advance lever must be down. Then turn the magneto armature over until the distributor carbon brush is about 45 deg. to the right of a vertical center line and above a horizontal center line through the distributor shaft. The breaker mechanism at this point will be almost on the center of the upper cam in the breaker box. Now being careful not to disturb either the camshaft or crankshaft setting attach the driving chain. If the magneto timing is correct the breaker points will separate within ½ in. of either side of the center line. A movement of one tooth will make a difference of 2½ in. on the flywheel. A more accurate adjustment is provided in the magneto driving sleeve which can be loosened and turned to bring the timing within the limits mentioned above providing it does not do so after the first setting. The slack in the chain should not exceed ⅛ in. between the longest centers.

Timing 1915 Lozier

Q.—Publish directions for timing a 1915 four-cylinder Lozier and for setting the magneto, which is a Z-R-4 type.—David Speer, Pittsburgh, Pa.

When timing the valves it will be noticed that both the camshaft and crankshaft sprockets are marked, thus simplifying the timing process. Between the camshaft and crankshaft sprockets in the engine front end case is an indicator, with two points indicating in the direction of the two sprockets. If the driving chain is removed for any reason the engine can be retimed by bringing these two marks on the sprockets in a line with the indicator and then attaching the chain.

To set the magneto in proper relation to the engine, insert a wire about 12 in. long through the priming cup in No. 1 cylinder and locate the upper dead center on the compression stroke. This position should be determined as accurately as possible. Next place the breaker box assembly on the magneto in its fully retarded position. Remove the cover plate from the breaker box and turn the armature of the magneto in the same direction as the engine rotates until the distributor carbon brush points toward the lower right hand corner of the magneto. Then continue to turn the magneto in the same direction until the breaker points are just ready to open. Hold the positions of the magneto and engine stationary and attach the magneto to its drive shaft and make the connections tight.

Engines

Record by Packard Engine

Q.—In what car was the 6-hr. record set by Ralph de Palma at Sheepshead Bay made on Nov. 16?

2—What was the engine in the Packard chassis used by Ralph de Palma in this race? Was it the aviation 300 cu. in. twelve-cylinder Packard or the Liberty aviation engine? The American daily papers of Nov. 17 and Aviation Review of Dec. 1 state the record was made by a Liberty engine, while MOTOR AGE and *Automotive Industries* gives it as a small Packard aviation engine. Which is true? If it was the Liberty engine, give me the features of this engine. Was it model four, six, eight or twelve-cylinder, and what was the size and displacement of the same?—E. Sanchez Marti, Havana, Cuba.

1—The 6-hr. record was established by Ralph de Palma in a Packard racing car powered with the Packard twelve-cylinder 300 cu. in. aircraft engine.

2—The engine used in the Packard chassis was the Packard twelve-cylinder 300 cu. in. aircraft engine having a bore of $2\frac{31}{32}$ in. and a stroke of 4½ in.

Mushroom Tappets Not Advisable

Q.—What effect will it have on the power of an Overland Model 61 engine to bore the bushings out and put in mushroom type push rods? It will make a change in the valves opening and closing. If the valves open and close practically on dead center, will it give more power?—T. B. Holt, Maysville, Okla.

This will probably produce a very noisy valve gear as the cams are not designed to use the mushroom type of follower, but for the roller type of follower. Cams designed to use the roller type of follower have a greater area to their lift diagrams consequently the gases have a better opportunity to pass in and out. We would suggest that the valve timing be left as it is, as the maker does a great deal of experimental work to determine the valve timing best suited for economy and power output.

Timing 1914 Marion

Q.—The engine on my Marion model B 1914 touring car has become very noisy, though it seems to have plenty of power. I have tightened the connecting rods, put in new wrist pins and think the trouble is in the timing gears, main shaft and camshaft, also in crankshaft, magneto and pump gears. Give details for replacing new gears with diagram showing how to time them, etc.—I. Carl Mitchell, Greensburg, Ind.

We have no definite details regarding this model. However, most engines have

Experience Meeting

What Was Your Experience with

Fuel Energizers?

MANY readers would like to know whether the fuel "dopes" designed to increase mileage of gasoline and remove carbon are really worth while. You who have tried any of the pellets, powders or liquids for the purpose will help many other readers by telling us how they worked out. In writing, tell the name of the energizer, the quantity used, the number of gallons of gasoline treated, what mileage per gallon you were getting before using it, what mileage you got with it, what changes were made in the carbureter adjustment, etc. Also the general effect in the running of the car, as to pulling, starting, acceleration, etc. Also its effect as a carbon remover.

This will be used with your signature or not as you prefer, but in every case the letter must carry full name and address.

The Experiences of Others

Double-Treading Tires

Crystal Falls, Mich.—Editor MOTOR AGE—I note in your last issue you would like to hear from somebody that has experience with double tread tires. I can tell you in very few words, they are no good. I sent in four old tires to be double treaded and when I got them back they looked fine. I thought here is where I get rid of some tire trouble. I started out the first day and had four punctures but could not see any holes in the casings. I came to find out that the tires in rotating rubbed together, producing friction and they literally burnt the tubes, so they were not fit to use. They are now in the junk heap.—Alec Leonard.

Injecting Water Vapor—I

Branford, Conn.—Editor MOTOR AGE—What could be more natural than that the problem of carbon in the motor car engine should find its solution in water. Sick engines, particularly the older models, will run better on damp or rainy days. Large stationary gas engines have a relatively small amount of water injected into the explosion chamber with the gasoline or gas. This water at each explosion flashes into steam and somehow prevents the formation of excessive carbon deposit, while softening the carbon that does form.

The writer has for several years owned a heavy car of the 1910 vintage. Day by day the engine showed a steady decline until at last the stage was reached where its teeth had to be brushed every 10 miles, more or less. Interpreted this means that all four spark plugs required cleaning every day.

The accompanying photograph shows how simply and cheaply the car acquired a new lease on life. The results of the water dripping device were far beyond expectations. The air intake of the old-style Schebler carbureter points skyward ready to accept anything dropped into its rapacious maw. The optimum rate of water supply seems to be about one drop every 2 sec. Anyone who has heard a squalling infant quiet down on receipt of its bottle can form some idea of how that old engine smoothed out and acquired power, as well as the ability to throttle down in a way it never would on gasoline alone. Some idea of the increase in efficiency may be gained from the fact that the spark plugs now need cleaning every 200 or 300 miles instead of every 10. On taking out the valves the carbon was found to be soft and mushy, giving a better compression.

Such a water feed device as this would be on all cars were it possible to make them fool proof, but the danger of drowning the carbureter is so great that manufacturers dare not risk it. The flexible rubber tube renders this home-made affair partially fool proof as the end of the tube is easily disconnected from the carbureter when leaving the car.

During the winter's cold a mixture of alcohol and water was used. This produced no back firing or preignition, so it seems pretty well proven that this particular engine runs better wet than dry.

The writer has seen a similar device rigged to take the water from the radiator. But a separate water supply seems better for two reasons: The water will be cleaner and free from rust; there is no danger of depleting the supply in the radiator.

The cost of a home made water system should be under a dollar and it is well worth trying if you have the least trouble with carbon in your engine.—E. B. Whiting.

Injecting Water Vapor—II

Crystal Falls, Mich.—Editor MOTOR AGE—In the Nov. 29 issue of MOTOR AGE I came across the query: What was your experience with water vapor injection into the cylinders of an internal combustion engine?

I have tried but one make and just at present I cannot recall the name of the contrivance, but it is a vapor economizer and draws the vapor from the water in the radiator.

I will say this as to my experience with it: find it very good, not that it saves so much fuel as to be particularly noticeable,

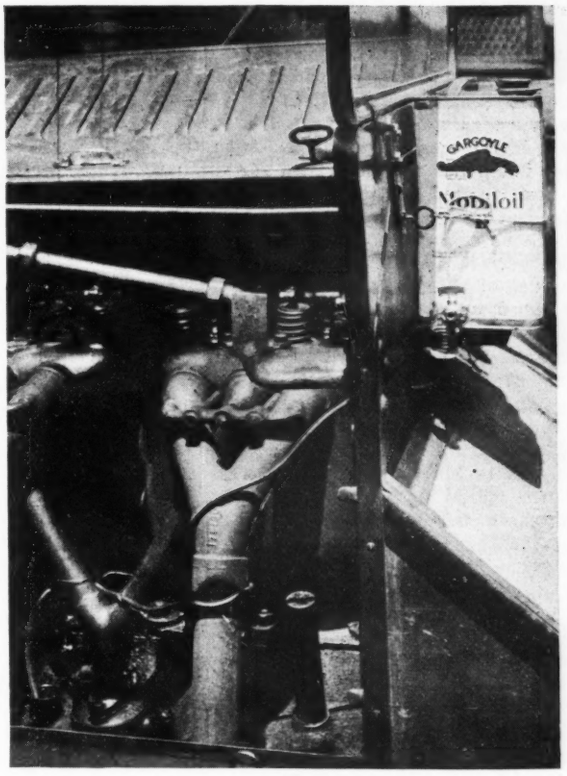


Fig. 1—Water-dripping device on 1910 car

but I had very much trouble with the valves and seats warping and pitting previous to installing said device, but it appeared as if there was just enough vapor injected or rather drawn into the cylinders on the suction stroke to overcome the intense dry heat that causes this trouble. After I had it on for the same length of time that I usually ran between valve grindings I took the valves out and found them in perfect condition, where as other times I would have to have them trued up on a grinder and use a reamer on the seats. These trials were on a valve-in-head engine.

Starting a Cold Car

Battle Creek, Mich.—Editor MOTOR AGE—Apropos of the matter of starting a cold car in cold weather, would say that two or three years ago I found the application of a hot water bottle full of good hot water to the intake manifold very helpful, convenient and practical. The hot water bottle, of course, is one of the handiest ways of holding and applying heat.

As related to this, I would be glad to advise that I find no difficulty in starting my Marmon 34 after two or three days' idleness in zero temperature without any auxiliaries or outside aids beyond the two carbureter attachments, one of which cuts off the air and the other increases the volume of gasoline. This car always starts after a few revolutions of the engine.

I have a 1916 Cadillac which is a very good starting car in the cold, although it doesn't start as readily as the Marmon.

I am using the regular Red Crown grade of gasoline furnished by the Standard Oil Co. in this city.—E. L. Branson.

Saving Gasoline

Anchor, Ill.—Editor MOTOR AGE—I have used a petcock for air in manifold. It saves gas. The per cent saved I am unable to give, but it is worth saving. I use a Wilmo manifold also, which saves gas. Mine is a 1914 Ford. The percentage of gas I save is not as large as they claim, but it saves enough, I presume 10 per cent, for me.—Dr. Charles Roy Kerr.

their timing marked on the flywheel and a new set of gears can be installed by utilizing this information. Before taking down the forward end of the engine it would be well to ascertain if the flywheel is marked. If the flywheel is not marked the first thing to do is to remove the spark plugs so as to avoid the possibility of the compression moving the crankshaft after the timing gears have been removed. Next mark the new gears the same as the old ones are marked. In so doing be careful to have the keyways in the same position as on the old gears. In all probabilities only the camshaft and water pump shaft

gears will be in need of replacement and the crankshaft gear will not have to be disturbed. When the camshaft gear is off be careful not to change the position of the crankshaft as this will throw the engine out of time. Then install the new gear. If the magneto is driven from the water pump shaft it must also remain in its position but if the gear teeth are marked at their points of contact no trouble will be experienced as if either moves it can be returned to its original position by means of the marks.

If the flywheel is marked then the timing can be checked by turning the engine over until the mark E O 1-4 comes up to the pointer and if the first cylinder is traveling downward on its power stroke, No. 1 exhaust valve should just commence to open at this mark. In order for the timing to be correct it should correspond with the marks on the flywheel.

To check the timing of the magneto, place the breaker mechanism in its fully retarded position and turn the engine over until the upper dead center for cylinder No. 1 on its firing stroke is reached. The distributor brush should be in contact with the segment on the distributor board corresponding to No. 1 cylinder. The breaker points in the magneto should open or just begin to open when the piston reaches upper dead center on its firing stroke. Of course this is the general ignition timing for almost any type of engine although the point of opening the breaker points may vary for a ½ in. or so on the flywheel.

Lining Up Pistons.

Q.—After fitting new upper wrist pin bushings to an engine is it necessary to line up the pistons? At first this may not seem a question of much importance. I know of jobs where new bushings have been installed, and the pistons not lined up; knocks developed that could not be traced out. One quite frequently reads in your inquiry column something like this: Have had my engine bored out; new rings fitted; new bushings, etc., etc. It has now developed a knock; or is pumping oil, perhaps and mechanics here cannot find it.

It seems to me with new upper bushings, no matter how good they are, or how carefully the job is done, that a piston is liable to be forced to one side of the cylinder, making a knock when run, and allowing oil to get past on the other side, regardless of the rings. Now perhaps I am wrong, perhaps the slight difference wouldn't matter. What do you think? I should like to know what others think?—A Reader, Waterloo, Iowa.

It is very bad practice to overhaul an engine and then to assemble it without lining up the connecting rods and pistons. Failure to do this invariably results in scored cylinders and pistons or else rapid wearing of the cylinder walls. This, of course, will produce piston slap and probably cause oil pumping. Pistons can be aligned by the use of an accurate square, a half cylinder, or some form of alignment jig similar to that described on page 33 of the Dec. 13 issue of MOTOR AGE.

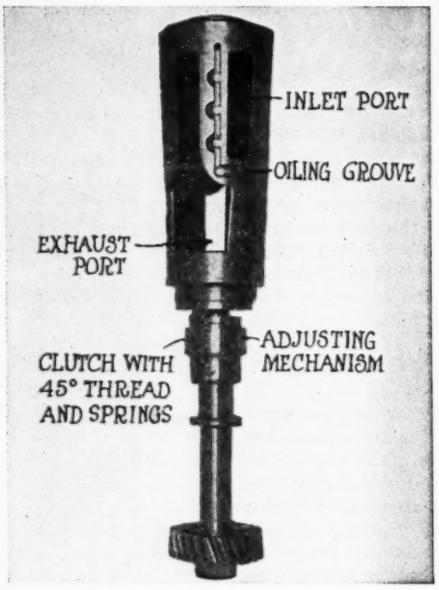


Fig. 3—Tapered rotary valve on marine engine

Marine Engine with Rotary Valve

Q.—Give the name of a firm making a marine engine with a tapered rotary valve in which carbon, according to manufacturers, is beneficial. Also give diagram of above and description.—H. Y. MacAlpine, Chatham, Ont.

The marine engine to which you refer is manufactured by the Driggs Ordnance Co., Inc., 120 Broadway, New York City. The valve, shown in Fig. 3, which is the feature of the engine is tapered, the small diameter being at the bottom. It rotates on a vertical axis, the vertical driving shaft containing a unique form of coupling, which is the feature of the entire design. This coupling is arranged so that one part carrying a screw of very coarse pitch, approximately 45 deg. being the pitch angle, engages with threads cut in the upper part of the coupling. These two pairs are held together by a spring box, the box being so regulated that after the valve begins to drag and stick in its seat with a friction which exceeds a predetermined amount—as determined by the springs in the clutch—the lower part of its shaft will rotate relatively a very high amount with reference to the upper part and this, through the action of the 45 deg. threads, lifts the tapered body in its seat and reduces the frictional drag.

In this way an automatic allowance is made for the swelling of the valve under the action of heat. As far as the valve itself is concerned, it is the ordinary hollow rotary valve which registers with ports leading into the combustion chamber. In this design, one valve is made to serve two adjacent cylinders, being driven at one-quarter crankshaft speed.

Chassis Price of Buick

Q.—What is the price of the chassis of the small six-cylinder Buick?

2—What is the revolutions per minute of the engine of this car?—George Huyck, Topeka. Kan.

The Buick Motor Co. has discontinued the practice of selling chassis only and are now selling nothing but the complete car.

The revolutions per minute of the Buick small six-cylinder engine is about 2000.

Loose Camshaft Chain

Q.—We have an Empire 33 that has a chain driven camshaft and the chain is so loose it will not stay in time. Have tried a new chain and camshaft gear, but trouble still exists. Using heavy gaskets would only allow the push rods to catch half of the valve stems and one link cannot be moved without removing two, which would make the chain too short.—C. R. K., West Frankfort, Ill.

It is possible that you are using a chain which is stretched in such a manner that it is of improper length and the only remedy is to secure a new chain to install on this assembly, as this will bring the side cover in alignment with the valves.

The Electric System

Generator for Charging

Q.—I have a Genemotor, 12-volt, 10 amp. capacity, which I took off a Ford car. I want to attach it to a small gas engine to charge batteries? Can I charge more than one at a time?—T. B. Holt, Maysville, Okla.

It would not be possible to charge more than one battery at a time as the machine has not sufficient capacity. If the battery to be charged is smaller than 100 amp. hour capacity, some low voltage lamps will have to be placed in series in the line to prevent an excessive charging rate. If the battery is an 80 amp. hour, the charging rate should not exceed 8 amp. This, of couse, will require placing the lamps in series in the line to reduce the charging rate. To high a charging rate will have a tendency to overheat the battery and cause the battery plates to buckle, thus producing a shorted battery cell.

Wiring Auto-Lite on Ford

Q.—Show diagram for Ford wiring system of an Auto-lite generator, three-brush type. This generator is built for the Overland car, but I want to use it on a Ford. I have the generator, the cut-out, the ammeter, and the battery and want to put them on a Ford and drive it in connection with the fan, as the Maxwell generator is driven.—A Subscriber, St. Louis, Mo.

A diagram for installing such a system on a Ford car is shown in Fig. 2. As you will note the lamps are grounded, as well as the negative side of the storage battery.

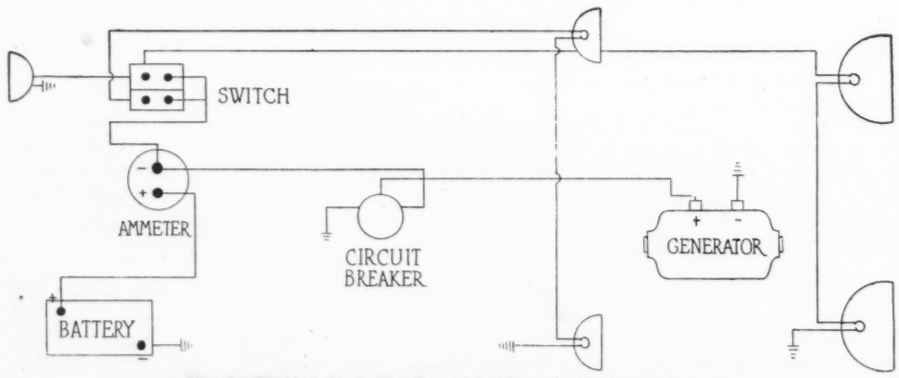


Fig. 2—Wiring diagram of Auto-Lite generator on Ford car

Splitdorf Ignition on 1910 Maxwell

Q.—I have a 1910 Maxwell Model E, four-cylinder, which I have overhauled. Advise me how to re-wire it. It has a Splitdorf magneto and Splitdorf coil, round type, dry battery

cells. Explain full wiring from battery to magneto to coil to dash switch.—J. B. Plasic, Fort Jennings, Ohio.

The Splitdorf magneto and coil is shown in Fig. 4. When the switch is thrown to the battery side current flows from the battery positive through the primary of the coil, which is grounded. The other side of the battery is also grounded through connection B on the magneto and magneto interrupter. This is the path of the primary current on the battery. However, as soon as the primary circuit is broken by the magneto interrupter a high-tension current is induced in the coil secondary and this current leaves the coil at D, travels through the high-tension distributor to the magneto distributor and then to the spark plugs in order. The secondary winding being grounded through the common ground G, and the plugs also being grounded, the circuit is complete.

When the switch is thrown to the magneto side current from the magneto armature leaves the instrument at A and travels to the coil switch A1 and from there back to the magneto to B through connection B1. From this point it goes through the interrupter points and then to the ground. This completes the magneto primary the armature also being grounded. When the magneto primary is broken a high-tension current is induced in the coil secondary and this leaves the coil at D and goes through the distributor. The wire marked G is a common ground, for both coil windings.

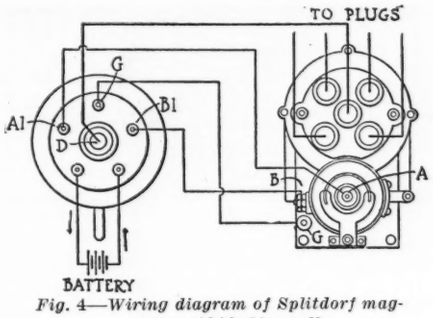


Fig. 4—Wiring diagram of Splitdorf magneto on 1910 Maxwell

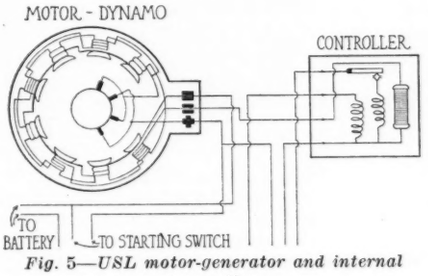


Fig. 5—USL motor-generator and internal connection

Wiring of U. S. L. Motor-Generator

Q.—Publish complete wiring diagram with details and internal connections of a U. S. L. motor-generator and regulator as used on Overland models 69 and 71.—R. W. Pennington, Spokane, Wash.

A diagram of the U. S. L. motor-generator and regulator internal connections is shown in Fig. 5.

Starter Does Not Operate

Q.—I have a Chandler 6-1917 model equipped with a Gray & Davis starter. Batteries test full, (1300) but will not turn engine over. What is the cause? Give diagram of starter and the way to take it apart and clean it, if that is necessary.—Homer Boyd, Sullivan, Ill.

If you keep your car in an unheated garage, the engine is probably so stiff owing to the congealed oil that the starter is not powerful enough to turn it over. Such an engine should first be limbered up with the hand crank, leaving the pet cocks open. After the engine has been turned over for a short while, you will find that it becomes more springy and in most cases the starting motor will be able to rotate it. Do not waste the current in the storage battery by a vain attempt to make the starter turn a stiff engine.

If your engine is quite limber and the starter will not revolve it, then the trouble may be in the starting switch, wiring or starting motor itself. Examine the switch and wiring to make sure that there are no loose connections. If the starter does not rotate at all, the battery terminals may not be making good contact, or if the trouble is in the motor, the brush may not be making good contact with the commutator. Also examine the spring on the Bendix-drive; if it is broken the engine will not be rotated.

If all of the above mentioned items do not offer a solution and you are sure that the battery is all right, examine the terminals of the latter and see if they are sulphated. Such terminals offer enough resistance to the current to prevent the starter motor from operating. The battery terminal where it is grounded to the frame, should be examined to see if the connection is in good shape. This terminal and its contact surface should be kept clean and drawn up very tight, preferably soldered. If the trouble seems to be in the motor itself, do not attempt to take it apart, but send it to the makers, or somebody specializing in this kind of work.

Rebuilding

1911 Cadillac into Speedster

Q.—Show design for a speedster body to fit 1911 Cadillac chassis.—Carl W. Abbott, Quincy, Ill.

This is shown in Fig. 6. The dotted lines are those of the old body and from these you will note that the new body is considerably lower, while the hood has been raised. The steering post has been given a greater angle, but not lengthened. When you build the body carry the sills right over the drop in the frame at the rear, filling in later with a piece of wood cut to fit. However, when you come to apply the metal on the wood frame bring it down to the top of the frame for its entire length. Thus the joint in the wood sill and filler piece will be entirely covered. Provision is made to carry the gasoline at the rear and just back of this is a compartment for spares. No fenders are fitted, but if desired, you can put a bracket on each side in front and one on the frame near the step, then stretch a piece of canvas between them, using a spring construction to keep the fabric taut. Such fenders are quickly applied and in rainy weather offer plenty of protection.

Tuning Maxwell for Speed.

Q.—Give suggestions for increasing car speed of 1917 Maxwell 25 touring car which I am rebuilding into a speedster. Would you advise double ignition systems. If so, state whether magneto or battery. Where can I obtain a sixteen-valve head?
2—Will grinding and tapering the cams increase speed?
3—Where can I obtain a special camshaft?
4—Will this engine stand a longer stroke and a larger bore? If so, how much?
5—What would be the best gear ratio on high for this model?
6—Would you advise reducing the weight of the car?
7—Which is the best cooling system, thermo-syphon or pump?
8—Where can I obtain special ratio gears?
9—Should the intake lift be the same as the exhaust?
10—How much larger can the valves be made?
11—Would roller bearings loosen up as quick as ball bearings in the front wheels?
12—Would you advise aluminum pistons?—F. J. Schmerheim, Saginaw, Mich.

1—Rebuilding any stock car into a racing job is quite a lot of work and there are many things you can do in the way of altering the chassis, etc., to get maximum speed. It is hard to give definite instruction, because every owner has certain ideas he would like to incorporate in the work. Also the changes you make will be governed to some extent upon the amount of money you spend, but the cost of doing the work can be cut down considerably if you do the work yourself. If you want out and out speed, there are a few things that you must sacrifice, like comfort and the inability to throttle down well on high gear. But assuming that you want it for a moderate high-speed car, then there are a few things that would be advisable in the way of tuning it and altering some of the parts.

Assuming that you have taken off the body, fenders, etc., the first thing is to get after the engine. We do not believe that it will be possible to get a sixteen-valve head for this car, inasmuch as these heads are confined chiefly for use on the Ford engine. However, you might write to the Roof Auto Specialty Co., Anderson, Ind., which concern makes these heads, to see if one is obtainable for your car. If it is impossible to get one there are several things you can do to the present valve system, which will be discussed later.

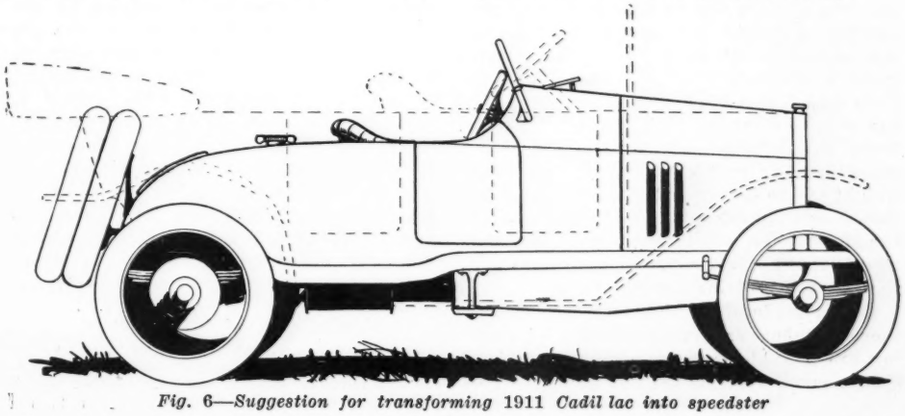


Fig. 6—Suggestion for transforming 1911 Cadillac into speedster

Either a high-tension magneto or an efficiency battery ignition system will be suitable for high speed work. We do not advise double ignition for this particular job, but believe that you will get very good results by keeping the present ignition system as it is.

2—In the Reader's Clearing House of the issue of Jan. 3, there appeared a layout for a high-speed cam. We suggest that you refer to this issue.

3—You will be able to get a special camshaft for racing purposes by writing to the McCadden Machine Works, St. Cloud, Minn.

4—You cannot increase the bore and stroke without changing materially the whole design of the engine. In case of the bore you might possibly increase this slightly and fit larger pistons, but be careful not to remove so much metal from the cylinder walls that they will be weakened. Probably $\frac{1}{16}$ or $\frac{3}{32}$ in. is all that you will be able to increase the bore. If there seems to be plenty of stock left, you might risk boring out a little more. When you fit the new pistons weigh them carefully, to see that they are all alike. If they are not all of the same weight machine the interior lightly, until the desired results are obtained. This makes it possibel to run the engine at high speeds without too much thrashing or vibration. Rings are to be lapped in carefully and very good results are obtained by using some of the patented forms of piston rings.

To increase the compression the cylinder head is sometimes planed down about $\frac{1}{8}$ in. This serves to lessen the open space above the pistons and raises the compression considerably. This operation had better be done by degrees.

Best Gear Ratio

5—It is difficult to give a specific answer as to the best gear ratio, for this depends upon so many factors. Racing cars for example often change the gear ratio for different tracks and also when the cars are to be used for road work. A good all-around ratio for general road work would be something like three to one. We do not think it advisable to go much below this. Gear ratio is a subject requiring much experiment and like so many other racing car questions can only be settled by many trials, often requiring considerable outlay in money.

6—The subject of weight also means road and track tests. As a rule as much unnecessary weight as possible is taken off but the car should be heavy enough to handle well at high speeds. Balance is as important as weight and usually you will find the engine is set back of the front axle quite a distance. In your case probably from 4 to 6 in. would suffice. To make the car steer better at high speeds, tilt the front axle a trifle more. Remember, too, when figuring your total weight, that the weight of the driver and mechanic must be taken into consideration and also that of the fuel. Be absolutely sure that the wheels line up properly, for if they do not the car will be tricky on the turns.

7—For moderately high speeds both the thermo-syphon and pump systems of cooling are suitable, but for maintained high speeds pump systems are the general rule.

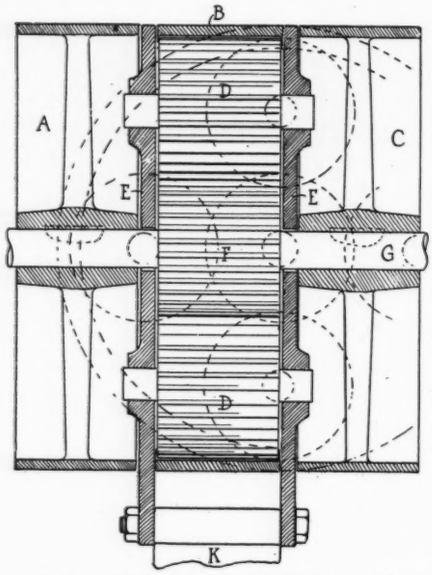


Fig. 7—Method of arranging three pulleys on shaft

8—You can get special ratio gears from the William Ganschow Co., Chicago, or the Detroit Radiator and Gear Co., Detroit.

9—Resetting of the camshaft in order to effect the valve timing is often done providing the operator knows what he is doing. The intake valve in most cases has the same amount of lift as the exhaust but this does not always hold true. Sometimes the exhaust may have $\frac{1}{16}$ in. or more lift than the intakes. There are advantages to opening the exhaust valves sooner and the intakes slightly earlier. Usually two engines will not prove alike in this respect, so the setting has to be tried out until a satisfactory one is obtained.

10—The valves can be increased usually from $\frac{1}{16}$ to $\frac{3}{16}$ in. This is a job that requires considerable work. Not only do the valve seats have to be increased in diameter and special large valves fitted, but the tappets over the cams have to be changed so that cams will operate as well as before. In increasing the valve size the position of the center of the valve and stem is likely to be changed.

11—Roller bearings should stand up as well as the ball type, in fact, for high speed work they would probably be superior.

12—Yes. We believe that you would be justified in fitting aluminum pistons. Here we should like to offer a suggestion which a prominent racing engine builder gave us recently. He fits his aluminum pistons with about the same clearance as cast iron pistons and overcomes oil-pumping by cutting rings around the surface of the pistons, $\frac{1}{16}$ in. wide, $\frac{1}{64}$ in. deep and about $\frac{1}{4}$ in. apart from the lower ring to the bottom of the skirt. Holes are then drilled in these annular rings about 1 in. apart and staggered. Thus any oil that is carried up between the piston and walls is squeezed into the small holes, which are $\frac{1}{16}$ in. in diameter, and forced back into the crankcase. If you do not care to fit aluminum pistons, some very excellent results are to be had with light weight gray iron pistons.

1910 Pierce-Arrow Speedster

Q.—Publish a sketch of a 1910 Pierce-Arrow 36 converted into a speedster with short fenders, no running boards and method for carrying an extra wire wheel.—E. C. Dell, Dallas, Tex.

A 1910 Pierce-Arrow 36 converted into a speedster and incorporating the items you ask for is shown in Fig. 8.

Fitting Brakes on Haynes

Q.—The internal expanding brakes on my Haynes car, model 36, are not effective for any length of time, although I have had new linings put in. Can I put in a pair of external contracting brakes and connect them to foot or service pedal and then link up both the present brakes to my emergency?—Fred V. Kreamer, Jewell City, Kan.

It may be possible to install a set of contracting brakes on this car, but we believe you would be going to a lot of trouble. We would suggest that you try first a good brand of brake lining and make sure that the adjustment of the brakes is properly made. Although both sets of brakes are completely incased, they may be readily adjusted by lifting the floor boards and changing the length of the rods. Before adjusting the brakes it is advisable to jack both rear wheels off the floor.

The hand brakes may be adjusted by changing the position of the yokes on the rod. To tighten: Remove pin, loosen the locknut and screw the yoke further onto the rod, then replace the yoke and test the hand brake. After the desired adjustment has been obtained, replace the cotter key in the pin and tighten the locknut. The foot brakes may be adjusted in the same manner at the adjusting yoke. Care should be exercised that the brakes act simultaneously on both wheels. If one wheel locks before the other stops turning, adjust length of the short rods at the rear axle ends.

If you decide to put in a set of contracting brakes, you must make some sort of carrier to fasten to the axle housing to support the bands. Then you could connect these to the service brake pedal and connect the internal expanding brakes to the emergency lever as you suggest. However, we believe, you will be better off by leaving the brakes as they are, for the designers of this car have given the subject far more attention than the layman.

Arranging Pulley on Shaft

Q.—How can I arrange a set of gears so as to run three pulleys on one shaft? Two are to go in one direction and the middle one to go in the opposite direction. Pulleys A and C are to be cast solid, pulley B to be cast as a ring so as to have internal gears to turn it in the opposite direction from pulleys A and C.

It appears to me that without having some means of locking the gear D stationary that they would crawl around the shaft so that the face of pulley B would not be going at the same speed as pulleys A and C, but which is absolutely necessary.—L. A. Hill, El Paso, Texas.

In Fig. 7 is suggested a method for arranging the three pulleys so that the two outside ones revolve in the same direction, while the middle pulley revolves in the opposite direction, but at the same speed as the outside pulleys. As shown the pulleys A and C are keyed to the shaft G, while the spur gear F, which is the same size as the gears D, is keyed to the shaft also. Obviously some means must be provided to hold the gears D stationary, so that they are free to turn on their supporting pins only. For this we have suggested plates E and F to go between the three pulleys and extending outside to a support K. These plates would not interfere in any way with the operation of the set and about the only objection to them would be

that they tend to increase slightly the overall width of the device. A device like this, to our mind, is quite expensive to make and we should imagine that if belts are to run over the pulleys it would be preferable to twist the middle belt and have the pulleys all run in the same direction.

Exporting Used Cars

Q.—Give the names of one or more firms who do exporting in second-hand or rebuilt automobiles.—E. S. Hayashi, Hilo, Hawaii.

We do not know of any concern that makes a practice of buying second hand automobiles for export. A great many used and rebuilt automobiles are exported to Cuba, Mexico and South America by individuals, such as one countryman buying and shipping an automobile for a fellow countryman.

The Latin-Americans have taken to the automobile to a man and as most of those who can afford an automobile at all have sufficient funds to buy a new one, which is no more than proper when you consider the current freight and insurance rates, they do not feel justified in spending a lot of money on something that is not considered the "real thing."

Fouling Ford Plugs

St. Louis, Mo.—Editor MOTOR AGE—I have noticed a discussion that has been going on in the Readers' Clearing House section regarding the fouling of the front cylinder of the Ford. The gentleman starting this stated that it was caused by the design of the manifold, others criticised his statment, saying it is caused by the oil. I want to tell these men my experience. I have a 1915 model 22 Metz roadster and, as you no doubt know, the Metz and Ford inlet manifolds are of similar design and in fact also are interchangeable. My Metz is equipped with a Ford model Wilmo manifold and Sundermann carbureter. If I adjust the carbureter so that the engine will start very easily and run smoothly at once without having run a while to warm up, the front plug will soot up with a dry soot after running about 10 miles. If, however, I give the engine a very lean mixture, so much so that the engine must run about 3 or 4 min. until it is warm enough to run smoothly, the front plug will stay absolutely clean just as the other three. The oiling system in this car delivers oil to each individual oil trough through each cylinder. I wish that some other Ford owners who have engines which soot on the front cylinder would try this very lean mixture and see if it cures the trouble.—John H. Erkmann.

Antioch, Tenn.—Editor MOTOR AGE—I have noticed in your Readers' Clearing House several of the readers are having trouble with the Ford front cylinders pumping oil. When the compression is good this trouble often may be stopped by putting a metal plate under the front support of the engine. Most of the oil is delivered beyond the front connecting rod trough, or the place where it dips; if the front of the engine is lowest the oil will stand deeper under the front cylinder than the others, causing more oil to be splashed up into it than the others. The front spring sometimes settles with use, causing the front of the engine to point down a little, when the car is level. By using a metal plate under the front support, the engine may be leveled up again. It is safe to use the thickest plate that the present spring clips will accommodate. If the front of the engine is ⅛ in. to ⅜ in. higher, it will be better. More oil may be carried in the engine than before the change was made and it will run better.—William Morrow.

Iowa City, Iowa—Editor MOTOR AGE—I note by your issue of Dec. 13 that J. B. Walker yet contends that the fouling of No. 1 cylinder spark plug of Ford cars is due to an excess amount of cylinder oil. In defense of the way I treated this subject in your issue of Nov. 15, I maintain that cylinder oil trouble has a very minor part to play in No. 1 plug trouble. As stated in my former letter, due to the action of centrifugal force and gravitation the heavier portions of gas and some raw gasoline, when striking the gooseneck to enter the upright pipe in intake manifold, of course, will strike the pipe on the side farthest away from the carbureter. Now this is a well-defined law of physics that to change the course of a fluid in motion, the said fluid, when changing its course, will throw the heavier portions to the outside. Therefore, the lighter portions will be thrown to the inside. Just as we have the familiar operation of the centrifugal cream separator, the heavier portions are on the outside of the mass and are drawn off as skim milk while the cream, being lighter, is forced to the center and drawn off as cream.

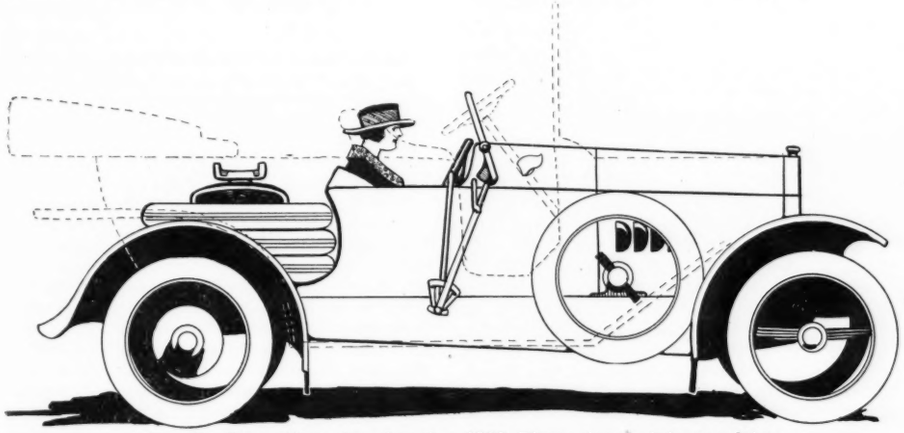


Fig. 8—Suggestions for changing **1910** *Pierce-Arrow into speedster*

We have going on within the intake manifold at all times the same law, the heavier grades of gas on side of pipe next to front cylinders and the light thin mixture on side of pipe next to rear cylinder. Thus we have an over-rich mixture in the front cylinders because the rear cylinders must have a mixture rich enough to fire and get good power.

In the gooseneck at the front end of intake pipe, where it connects to cylinder block, we have the same law to apply, that the heavier portions of the fluid are thrown to the outside and nearly directly into No. 1 cylinder while No. 2 cylinder gets the lighter portion of the fuel in that end of manifold. Thus you see why No. 1 and 2 cylinders do not behave alike but still show signs of an over-rich mixture which is more marked in No. 1 than in No. 2.

Now we must remember that this process of separation of the fluid mixture in the manifold is not very great for each cycle of the engine, but after we consider the countless number of revolutions the engine makes in a few days' travel, we can see that the results finally would tell on No. 1 plug by a gradual deposit of unconsumed carbon from the gasoline fuel.

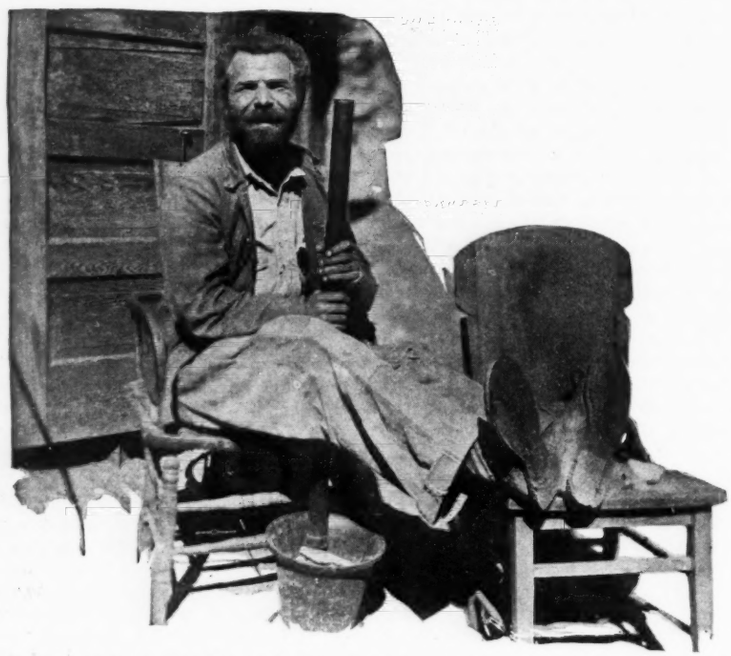
Now J. B. Walker goes on to state that the head of oil maintained in No. 1 connecting rod dip is so great as to cause an excess amount of oil in No. 1 cylinder. Now if this were the case, why is it you never see the characteristic blue oil smoke coming from the exhaust after the engine is warm? We will make two comparative tests. Adjust the carbureter needle ½ turn or more open than normal adjustment. No. 1 plug will begin to foul up with a fine soot-like deposit just before it becomes inoperative, while No. 2 plug will show quite a little disturbance and No. 3 and 4 plugs less, yet in spite of all the non-leaking, tapered or any other kind of piston rings.

Two Tests

We will now adjust carbureter to normal, put in 3 pt. of cylinder oil above the high oil level pet cock. No. 4 will begin to show a coarse spongy deposit of cylinder oil. Now make a comparison of No. 1 plug in the first test and No. 4 plug in the second test with a plug in an engine that gives front cylinder trouble just before it gets too dirty to fire. No. 1 plug in the first test will compare favorably, in giving front cylinder trouble. Always make these comparisons of dirty plugs before they quit firing so as not to be covered with cylinder oil.

Another one of my early experiments was to drill a $\frac{3}{32}$-in. hole in the oil pipe under the center camshaft bearing so that part of the oil never went forward into No. 1 and 2 dips at all. Also I have cut a piece of the strap away, at the rear, so that the cap screws screw into the hole on the bottom plate, thus lowering the oil level ¼ in., but all to no avail. I have designed and had made a special intake manifold that overcomes this trouble entirely. I can take a plug, no matter how dirty, just so it has not yet ceased to fire, put it in No. 1 cylinder on any Ford, and in an hour's driving it will come out with a nice brown porcelain showing perfect combustion.—Clayton Smith.

Among the Makers and Dealers



A NEW USE FOR TIRES—In piloting guests across Furnace canyon, L. R. Uhlenhart of the Los Angeles branch met this man crushing ore. Notice his shoe soles. They are parts of a tread from a Goodrich safety-tread tire

WHITAKER Leaves Detroit Truck—Donald F. Whitaker, sales and advertising manager of the Detroit Truck Co., Detroit, has resigned.

Sheehan Resigns from Globe—Walter F. Sheehan has resigned as general manager of the Globe Motor Truck Co., East St. Louis, Ill.

Works Three Years for Position—C. J. Cunningham has been made service manager of the Detroit Weatherproof Body Co. For the last three years he has been working in the factory with this position in view.

Henry and Herron with Dart—H. H. Henry has been elected president and general manager of the Dart Motor Truck Co., Waterloo, Iowa, and Milo D. Herron has been appointed general sales manager. Mr. Henry formerly was manager of the Maxfer in Chicago, while Mr. Herron assisted in the formation of the Thomas Auto Truck Co.

Wisconsin Duplex to Build Plant—The Wisconsin Duplex Automobile Co., organized a year ago to manufacture a quadruple-drive passenger and commercial car chassis, has selected Oshkosh, Wis., as the permanent location of its factory and offices. Early in the spring a large machine shop will be erected and the manufacture of chassis undertaken on a large scale. Until then the present experimental shops at Milwaukee will be continued.

Trenam Tractor Buys Plant—The Trenam Tractor Co., will establish a plant and headquarters at Stevens Point, Wis. The company has purchased outright the entire plant and holdings of the Central City Iron Works, consisting of a malleable and gray iron foundry, machine and assembling shops and office and warehouse building, and already is making the first castings for the new tractor. It is hoped to start regular production of tractors by March 1. Five demonstrating machines have been completed and subjected to tests. The company will concentrate on one type, a 12-24 hp., serving as a power unit as well as a substitute for horse power.

Phipps Resigns From Hercules—Walter Phipps has resigned as general manager of the Hercules Motor Mfg. Co., Canton, Ohio.

Henshaw Resigns from Michelin—R. D. Henshaw, who has been associated with the Michelin Tire Co. for approximately ten years in charge of the New England and New York sales districts, has resigned.

Hernandez Now with Carlisle—R. M. Hernandez, for ten years with the United States Tire Co. in the central states district, has been appointed central district manager of the Carlisle Cord Tire Co., Inc. His headquarters will be in Chicago.

To Make Wire Wheels for U. S. A.—The Stewart Wire Wheel Corp., Frankfort, Ind., has signed a Government contract to manufacture 4500 wire wheels for airplanes. Approximately $45,000 is involved in the order. The company expects to devote all its time to Government work until the contract is filled.

McLin Now with Williams Stores—George H. McLin, for three years manager of the tire and accessory department of the United States Rubber Co. in Chicago and later sales promotion manager of the Burd High Compression Ring Co., is now manager of the tire and accessory store of the Charles Williams Stores, Brooklyn, N. Y.

Republic Expands Foreign Business—The Republic Motor Truck Co. has received an initial order for fifteen trucks for a company in China. This order was for shipment in the early part of this year, and is but part of the company's westward expansion. At present fifteen are on their way to Japan, and an order for several fire trucks in Manila is being filled. The freight car situation is one of the greatest problems today, and daily driveaways of from ten to fifteen trucks help to relieve the situation. One of the longest of these was to Baltimore, Md.

Welsh Now with King Branch—C. J. Welsh has been made vice-president and manager of the Detroit branch of the King Motor Car Co. Mr. Welsh has been actively connected with the industry for many years, having in the past been sales manager of the Abbott Corp., Interstate Motor Car Co. and the Apperson.

Swan Now With Pearce Tire—H. H. Swan, who for six years has been superintendent of the tire department of the Portage Rubber Co., has been elected a director and general superintendent of the Pearce Tire & Rubber Co., Ashtabula, Ohio. The company is planning to increase its capital to $200,000 this month, and expects to be in operation by April 1, as the plant has been completed.

Murray Manages Apperson Branch—L. G. Murray, formerly manager of the United States Motor Co., and later southern district manager for the Haynes Automobile Co., has been appointed manager of the Chicago branch of the Apperson Motor Car Co., succeeding J. C. Erbst, who has been advanced to other work. Irving H. Jones has been made retail sales manager for the Apperson.

Duplex Trucks Move Equipment—The Duplex Truck Co. figures that it saved $500 by moving 1000 tons of machinery and materials overland and by trucks when it moved from Charlotte, Mich., into the new factory at Lansing. In all 224 trips were made, each load averaging 4½ tons. Each truck made four trips a day and hauled a total of 18 tons daily. The operating cost of each truck, including drivers' wages, was $10 a day.

Kilesrath With Simms Magneto—Victor W. Kliesrath, for many years chief engineer of the Bosch Magneto Co., has acquired an interest in the Simms Magneto Co., East Orange, N. J., and will devote his entire time to the business as consulting engineer. It is probable that new types of magnetos not made by the Simms company will be added to complete a line of ignition equipment to meet every requirement.

Changes in Stephens Sales—M. A. Steele, formerly sales manager of the Stephens Motor Branch of Moline Plow Co., has been appointed one of the trade managers of the Moline Plow Co. and will have supervision of several branch houses as well as Stephens. C. Roy Clough, formerly district sales manager of the Ohio territory, has been brought to the main office, where he will act as sales manager of Stephens. J. F. Hunter will succeed Mr. Clough.

Lang Body in Production Soon—The Lang Body Co., Cleveland, Ohio, manufacturer of passenger car and truck bodies, is completing its building and expects to be in production by Feb. 1. The company now has in stock lumber for the manufacture of commercial bodies of any style or description, and is also in a position to manufacture closed car bodies of aluminum or steel. It occupies 5 acres, and has an option of 5 more acres of land immediately adjoining. The personnel is: President and treasurer, Charles E. J. Lang, formerly vice-president and treasurer of the Rauch & Lang Carriage Co., and later vice-president and director in the new consolidation of the Rauch & Lang Carriage Co. and the Baker Co.; vice-president and general manager, Elmer J. Lang; secretary, John H. Price. L. L. Williams.

Muskegon, Mich.—Advance Brass Mfg. Co.; capital stock, $25,000; incorporators, Oscar Berg, Wallace Foote and Felix St. Louis.

Marshall, Texas—Lothrop Auto Co.; capital stock, $5,000; incorporators, M. Lothrop, Sr., Grafton Lothrop and M Lothrop, Jr.

Milwaukee, Wis.—Hellwig Carbureter Co.; capital stock, $30,000; to manufacture and market carbureters and other motor car accessories; incorporators, Frank L. McNamara, Harold W. Connell and John G. Hurley.

Milwaukee, Wis.—National Supply Co.; capital stock, $25,000; to deal in motor vehicles, supplies, accessories, etc.; incorporators, J. W. Hume, Max Kohn and John Roache.

Milwaukee, Wis.—Rothmann Motor Truck Co.; capital stock, $10,000; to manufacture and market motor trucks, tractors, etc.; incorporators, Louis Rothmann, Edna Blatz Rothmann and Carl H. Juergens.

Milwaukee, Wis.—Atlas Foundry Co.; capital stock, $10,000; to manufacture gray iron castings; incorporators, George P. Gerlinger, Orvel A. Meyer and B. A. Gerlinger.

Oklahoma City, Okla.—Mid-West Tire and Accessory Co.; capital stock, $25,000; incorporators, C. Carpenter, Frank Freeman and F. F. Monroe.

Oklahoma City, Okla.—Capital Motors Co.; capital stock, $25,000; incorporators, G. Ogden, C. L. Loos, Jr., and J. Densford.

Pittsburgh, Pa.—Duke Motor Co.; capital stock, $500,000; to manufacture motor vehicles; incorporators, A. M. Holloran, S. A. Williams and Ferris Giles

Quincy, Ill.—Baldon Automobile Service Station; capital stock, $10,000; incorporators, B. F. Baldon, A. W. Hennig and S. A. Hubbard.

Phoenix, Ariz.—American International Railways Corporation, capital stock, $10,000,000; to manufacture, buy, sell and deal in motor vehicles of every description; incorporators, H. W. Barkley, C. R. Hudson and R. E. Mitchell.

Recent Incorporations

Phoenix, Ariz.—Perfection Auto Window Co.; capital stock, $100,000; to buy, sell, manufacture and deal in cars and accessories; incorporators, I. J. Lipsohn and H M. Harrison.

Phoenix, Ariz.—Miller Brake Sales Co.; capital stock, $100,000; to manufacture, purchase and sell car fixtures, brakes and accessories of every description; incorporators, H. M. Harrison and D. M. Foster.

Phoenix, Ariz.—Smith-Hughes & Co.; capital stock, $30,000; to wholesale and retail cars and supplies; incorporators, W. Taylor Smith, C. K. Hughes and W. J. Schiedler.

Springfield, Ohio—Burke Motor Co.; capital stock, $9,000; incorporators, Charles J. Burke, Harley C. Hesterran, Anna J. Burke, James A. Linn and Forest S. Wolf.

Sturgeon Bay, Wis.—LaMere Automobile Sales Co.; capital stock, $10,000; to deal in new and used cars, operate garage, etc.; incorporators, F. J. LaMere, E. H. LaMere and J. A. LaMere.

Texico, N. M.—Cannonball Motor Co.; capital stock, $10,000,000; incorporators, C. A. Roberson, W. L. Mansfield, J. B. Hanlin, D. A. Randall and J. C. Milne.

Tiffin, Ohio—Globe Motor Parts Co.; capital stock, $10,000; incorporators, John A. Manecke, Howard G. Cook, George C. Wiseman, Raymond W. Miller, and Forrest R. Mellin.

Toledo, Ohio—Toledo Auto Fabric Co.; capital stock, $150,000; incorporators, Ralph A. Landers, Rob V. Phillips, Frank L. Mulholland, Charles Hartmann and F. K. Denny

Toledo, Ohio—Sturtevant-Jones Co.; capital stock, $25,000; incorporators, Claude L. Sturtevant, Paul H. Jones, Walter G. Kirkbride, John M. McCabe and Wayne R. Peppers.

Welch, Pa.—Hill Motor Co.; capital stock, $25,000; incorporators, G. A. A. Swope, J. Logan Hill, W. W. Johnson, B. N. Gay and J. N. Harman.

Waukesha, Wis.—Waukesha Truck Brake Co.; capital stock, $25,000; to manufacture a braking system for motor trucks; incorporators, E. L Arnold, J. L. Able, F. H. Halladay and W. S Halladay.

Wichita, Kan.—Doan Tire & Rubber Co.; capital stock, $20,000; incorporators, Floyd L. Doan A. F Slaght and A. B. Eisenhower.

Wichita, Kan.—State Auto Supply Co.; capital stock, $100,000; incorporators, John Amos, R. R Cox and Frank Heilig.

Youngstown, Ohio—Youngstown L. & M. Auto Supply Co.; capital stock, $25,000; incorporators Emil P. Linberger, Fred Linberger, Helen Linberger, Ernest A. Moritz and Marguerite Moritz

Youngstown, Ohio—Mannweiler-Kuhns Auto Sales Co.; capital stock, $5,000; incorporators F. Ralph Mannweiler, Roy C. Kuhns, Henry J Kuhns, John W. Kuhns and Mrs. Ralph Mannweiler.

Younstown, Ohio—York Motor Sales Co.; capital stock, $10,000; incorporators, C. A. Gifford A. W. Gifford, James J. Hill, H. A. Hill, L. M Salsgiver and M. Salsgiver.

Youngstown, Ohio — Youngstown-Nash Co. capital stock, $10,000; incorporators, T. W. Rowland, Ira S. P. Fahrney, L. S. Lippla, Joseph I Eagleson and Glenn D. Whisler.

with the body department of the Peerless Motor Car Co. for nine years, is engaged in similar work in the Lang company.

Pearson to Represent Denby Truck—A. N. Pearson has been appointed district representative in the New England states for the Denby Motor Truck Co., and will have his headquarters in Boston.

Willard Battery Promotes Sayre—A. W. Sayre has been appointed district manager of the New York factory branch of the Willard Storage Battery Co., Cleveland, Ohio. Mr. Sayre formerly was in charge of the service station at Rochester, N. Y.

Private Railroad Cars for Oaklands—The Oakland Motor Car Co. has obtained fifty new freight cars direct, and these are being loaded and made into a train for immediate transportation of motor cars to Seattle and Portland. As each freight car will carry five passenger cars, 200 will be delivered at one time.

Auto Wheel Co. Earns 20 Per Cent—The Auto Wheel Co., Lansing, Mich., in the year ending Oct. 10, 1917, earned approximately 20 per cent on its outstanding capital of $300,000. The company has been operating at nearly its capacity of 400 sets of motor car wheels daily, and recently a large Government order was received.

Christmas with the Makers—Among the makers of the automotive world during the Christmas season various ways were observed in keeping the Christmas spirit. For instance, the Firestone Tire & Rubber Co. gave each of its employees at Akron, Ohio, a bank book with a credit of $1, while the employees in the fifty branches received $1 thrift stamps. The B. F. Goodrich Rubber Co. presented 88,000 thrift stamps to its 22,000 factory employees, or $1 to each. The Torbenson Axle Co., Cleveland, Ohio, gave each of its 500 employees a certificate of insurance as a Christmas gift. Those who have entered the service of the company since July 1, 1917, are insured for $250, this amount to be raised to $500 on completion of six months' service. Those who have been with the company for more than a year are insured for $600, with an increase for each additional year of service until a maximum of $1,500 has been provided. In place of its usual Christmas gifts to its employees the Dort Motor Car Co. doubled the sum it ordinarily would appropriate for that purpose, and sent it in cash pro rata to the sixty-three Dort factory men now in the service. The action was taken at the suggestion of a shop employe. The Curtis Pneumatic Machinery Co. donated to the Red Cross the amount heretofore invested in holiday greetings cards in addition to its regular subscriptions.

Gillette Motors Is Sold—The Gillette Motors Co., Mishawka, Ind., has been sold to M. W. Mix, president of the Dodge Mfg. Co., and the sale has been approved by the South Bend circuit court. The consideration was $151,000.

Westinghouse Declares Two Dividends—The Westinghouse Electric & Mfg. Co. has declared a regular quarterly dividend of 1¾ per cent on the common, payable Jan. 31, to stockholders of record Dec. 31, and a preferred common dividend, payable Jan. 15 to stockholders of record Dec. 31.

Spokane Dealers Form Organization—Practically every leading dealer was represented at the organization of the Spokane, Wash., dealers' association Dec. 28. Officers were elected and as part of the dinner each dealer introduced himself Dutch fashion, boosting his own business and giving his car's slogan.

Denby Distributors Visit Plant—From eight to ten distributors of the Denby Motor Truck Co. spent a day at the plant in Detroit, stopping off on their way to the New York show. Though no dealers convention has been arranged, for the last two weeks there have been about this number at the plant at all times, and most of them seeking additional allotments for 1918. The dealers were from Portland, Ore.; Spokane, Seattle, Kansas City, Chicago, Des Moines, Omaha, Columbus and St. Louis.

Star Tractor Begins Plant—The Star Tractor Co. has begun the erection of its plant at Findlay, Ohio. It will build a $750 machine. The capital stock is $100,000. J. E. Bicknell is president, C. A. Schubert, vice-president; C. E. Jordan, secretary.

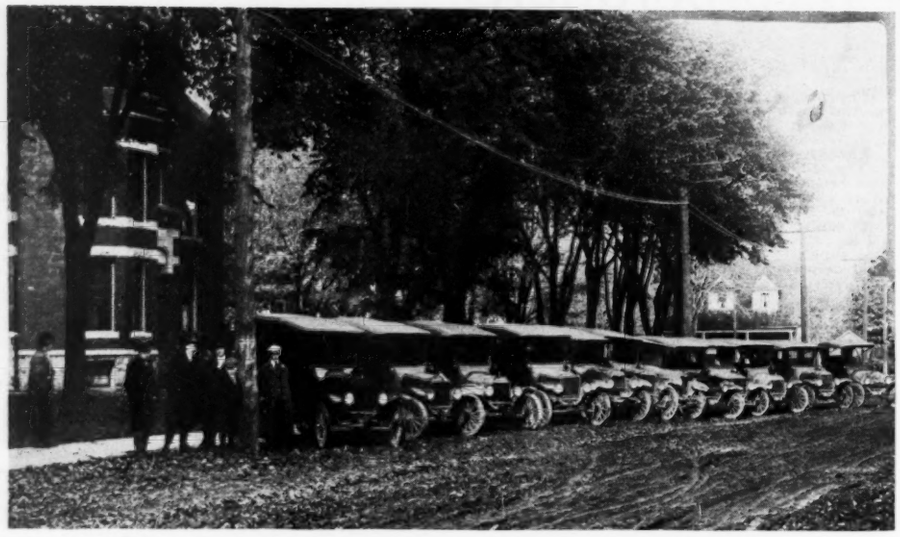
Coffeen Heads Willys-Overland Branch—Roy Coffeen is branch manager of the Willys-Overland, Inc., at Cleveland, Ohio, succeeding M. O. Bridgman, who, for the last five years has held the position.

To Make Tractor at St. Louis—The Zelle Tractor Co. has been organized in St. Louis, Mo., to manufacture a tractor designed by William G. Zelle. The tractor has a 33-in clearance, which enables its use as a cultivator of growing crops. Zelle is president of the new company and local insurance men and bankers are officers.

Goodyear Changes Branch Managers—F. J Redman has been transferred from the Hartford, Conn., branch of the Goodyear Tire & Rubber Co. to the manufacturers' sales department in the New England district with headquarters at Boston. He is succeeded at Hartford by E. J. Smith, formerly manager at Providence, R. I., who in turn is succeeded by O. C. Pahline, formerly Providence territory salesman.

TIRE SURVIVORS OF FIRE AND WATER—These tires went through fire and water recently when a fire destroyed the Goodyear Hartford, Conn., branch. The fireman furnished the water. And Stockholm pays $150 for one tire!

From the Four Winds



CARS STOLEN BY THE DOZEN—Here is an example of why car insurance is hard to get in Detroit. Twelve stolen cars were recovered in one group by the sheriff. They were marketed through the medium of a second-hand dealer

TWENTY-NINE Take Detroit Space—Practically all space for the seventeenth annual Detroit show has been taken, and there will be about seventy-nine exhibitors, including passenger cars, trucks and accessories. The show is to be held in the Overland building and will occupy the second and third floors.

Orange Day in Toledo—H. W. Lancashire, a dealer at Toledo, Ohio, gave away 1000 crates of oranges, each containing a dozen, to the children of the city two days before Christmas. The idea was conceived last Christmas when he received a large consignment of oranges as a gift from his brother, who conducts the Lancashire orange groves near Naranjo, Cal. Tickets to the moving-picture shows also were distributed.

To Teach Tractor Efficiency—The University of California will conduct a tractor course at the citrus experimental station maintained by the university at Riverside. A tractor course held recently at Davis, Cal., was attended by 184, most of them practical ranchers and many of them men of middle age and well-to-do land owners. They came from every part of California and some were registered from Pennsylvania, Illinois, Mexico and Peru. The experts in agricultural engineering of the university and the demonstrators sent by tractor factories will give talks and exhibitions during the course on how to use tractors economically, how to care for ignition systems, lubrication, valve timing, repair and maintenance, and how to get the greatest efficiency in obtaining deep tillage and improving farming methods.

Placing the Blame Correctly—A state law in Minnesota makes it a misdemeanor to drive away after running down a human being. A Minneapolis driver subconsciously took no chances when a car overturned his mail wagon. He grabbed at anything that would save him from destruction, and when he came to he had the license number tag of the offending car in his hands. This enabled the police to trace the car owner.

Twin Cities Ready to Exhibit—The reservations for the Twin City Automobile and Industrial Exhibition Feb. 2-9 have grown so fast the Minneapolis Automobile Trade Association has had to add enough space on the third floor for the industrial show, making a total floor space of 225,000 sq. ft. for the exposition. With the co-operation of the St. Paul Automobile Trade Association the registration of tractor and truck makers and other industrial companies has been very heavy. Everything made in the Twin Cities is to be displayed, and the Government will send food conservation lecturers. Exhibits are as follows: Passenger cars, 145; accessories, 180; trucks, fifty; tractors, 125; industrial, 1000. Receipts the first day will be given to the Red Cross.

Texas Registers 194,740 Motor Vehicles—Up to Jan. 1 the Texas state highway commission registered 194,740 motor vehicles. The number of dealers in the state is 3094. Licenses were issued to 12,696 chauffeurs. In the registration there is no separation of motor cars, commercial cars and motor trucks. Included in the motor trucks are those owned and operated by the United States army and other departments of the Federal Government, but no registration fee is charged for these.

Texas Working on Meridian—Altogether $471,131 has been raised for that part of the Meridian highway which is to run from Pembina, N. D., to Laredo, Tex., on the Rio Grande border. Part of this money is Federal. An additional $500,000 will be required to complete the road through Texas. Seventeen cities of more than 5000 population, thirty-four towns of more than 1000 population and 186 towns of less than 1000 population are on the highway, which will run through six states.

To Hold Contest for Milwaukee Show—The Milwaukee Automobile Dealers, Inc., has arranged two essay contests, in which two $50 Liberty bonds will be awarded, to stimulate interest in the first annual Milwaukee commercial car show, which will follow immediately upon the tenth annual passenger car and accessory show Jan. 18-24 and last three days, or until Jan. 27. One contest is limited to motor truck drivers, who will write on "The Best Method of Caring for a Motor Truck." High school students will write on "The Value of Motor Truck Transportation."

Northwest Car Loss Is 1000—About 1000 cars were stolen in the Twin Cities and Northwest in 1917. This means that Minneapolis and St. Paul and nearby towns lost heavily, about 75 per cent being stolen from Minneapolis, according to reports. Of 20 per cent taken in St. Paul the police report three-fourths of the number were recovered. In February twenty-two cars were taken, but in September the number reached 157 in the Twin Cities. Makes ranked as follows in the theft schedule: Fords, 504; Buicks, 190; Studebaker, thirty-six; Hudson, twenty-six; Dodge Brothers, twenty-five; Oldsmobile, twenty; Chalmers, eighteen; Maxwell, thirteen; Cadillac, eleven; Packard, ten; Kissel-Kar, nine; Haynes, five; Reo, four; Winton, two.

Coming Motor Events

MEETINGS

Jan. 10—New York, S. A. E., Automotive dinner at Hotel Biltmore.
Jan. 11-16—New York, National Association of Automobile Accessory Jobbers' convention.
Feb. 1—Chicago, S. A. E., War dinner at Hotel Horrison.

SHOWS

Jan. 5-12—New York.
Jan. 9-27—Cleveland, Ohio.
Jan. 11-18—Washington, D. C.
Jan. 11-19—Providence, R. I.
Jan. 12-19—Philadelphia, Pa.
Jan. 14-19—Rochester, N. Y.
Jan. 16-25—Milwaukee, Wis.
Jan. 19-26—Montreal, Canada.
Jan. 19-26—Detroit.
Jan. 19-27—Cleveland, Ohio.
Jan. 21-26—Scranton, Pa.
Jan. 21-26—York, Pa.
Jan. 21-26—Buffalo, N. Y.
Jan. 21-26—Wilmington, Del.
Jan. 22-26—Oklahoma City, Okla.
Jan. 22-26—Baltimore, Md.
Jan. 26-Feb. 2—Chicago.
Jan. 26-Feb. 2—Harrisburg, Pa.
Jan. 26-Feb. 2—Columbus, Ohio.
Feb. 2-9—Minneapolis, Minn.
Feb. 5-9—Binghamton, N. Y.
Feb. 7-13—Portland, Ore.
Feb. 11-16—Kansas City, Mo.
Feb. 11-16—St. Louis, Mo.
Feb. 11-17—Toledo, Ohio.
Feb. 16-24—San Francisco, Cal.
Feb. 18-23—Syracuse, N. Y.
Feb. 18-23—Grand Rapids, Mich.
Feb. 18-23—Springfield, Ohio.
Feb. 18-23—Des Moines, Iowa.
Feb. 18-23—Duluth, Minn.
Feb. 18-23—Nashville, Tenn.
Feb. 18-25—Pittsfield, Mass.
Feb. 18-27—South Bethlehem, Pa.
Feb. 20-23—Quincy, Ill.
Feb. 20-23—Des Moines, Iowa.
Feb. 25-March 2—Salt Lake City, Utah.
Feb. 25-March 2—Muskegon, Mich.
Feb. 26-March 2—Omaha, Neb.
March 2-9—Boston, Mass.
March 6-9—Clinton, Iowa.
March 6-9—Sioux Falls, S. D.
March 16-20—Great Falls, Mont.
March 20-23—Trenton, N. J.
April 9-13—Stockton, Cal.